



Wayne County Community College District

COURSE SYLLABUS

AUT 121 Suspension and Steering I

CREDIT HOURS: 3.00

CONTACT HOURS: 60.00

COURSE DESCRIPTION:

This course is designed to introduce the student to basic components and operations of the automotive suspension & steering systems. Troubleshooting, inspection, and diagnosing of suspension & steering problems will be applied in this course. The student is expected to perform these techniques to show competency in this area. In addition, ASE principles for certification will be highly stressed and applied in this course.

PRE-REQUISITE: AUT 114, AUT 115, AUT 116 and AUT 117

EXPECTED COMPETENCIES:

Upon successful completion of this course, the student will be able to:

Industry Information

- **Identify various career types in the automotive field**
Objective
 - Identify the eight Automotive Service Excellence (ASE) service areas for technicians and the components included in each.
 - Identify career opportunities directly related to the automotive technology field.
 - Identify various methods used to pay automotive technicians.
 - Identify the difference between a union and a non-union shop.

Shop Safety

For every task in Steering and Suspension, the following safety requirements must be strictly enforced: Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

- **Identify protective clothing and equipment and their proper use; proper shop behavior; principles of fire safety; and federal regulations concerning hazardous material and shop safety.**
Objective
 - Describe how to select individual personal protective clothing and equipment.
 - Identify the dangers of improper behavior in the shop.
 - Identify the importance of proper grooming and hygiene.
 - Identify the classes of fires and the types of fire extinguishers.
 - Identify the use of a fire blanket.
 - Identify general fire emergency procedures.
 - Identify the Occupational Safety and Health Administration (OSHA) regulations.
 - Identify the Environmental Protection Agency (EPA) regulations.
 - Identify the safe use of fire protection equipment
 - Identify the safe use of shop equipment following Environmental Protection Agency (EPA) and Occupational Safety and Health Act (OSHA) regulations



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- **Identify and explain the safe and proper use of chemicals**

Objective

- Identify the types and uses of solvents.
- Identify the types and uses of soaps and cleaning solutions.
- Identify the types and uses of oils.
- Identify the types and uses of greases.
- Identify the types and uses of specialty additives.
- Identify the types and uses of specialty chemicals.
- Describe the five general rules for using automotive chemicals.
- Complete the assignment sheet on lubricants.
- Complete the assignment sheet on lubricants.
- Identify gasses and the hazards they present.
- Identify the hazards of asbestos dust.

- **Identify and explain the safe and proper use of basic hand tools**

Objective

- Identify the types and uses of common end wrenches.
- Identify the types and uses of socket set components.
- Identify the types and uses of wrenches.
- Identify the types and uses of screwdrivers.
- Identify the types and uses of pliers.
- Identify the types and uses of hammers.
- Identify the types and uses of punches and chisels.

- **Identify and explain the safe and proper use of specialty tools, fasteners, and measuring tools**

- Identify the types and uses of specialty tools.
- Describe the procedures for cutting threads onto a rod or into a hole, repairing damaged threads, and removing broken bolts.
- Identify common nuts and bolts in the English system.
- Identify common nuts and bolts in the metric system.
- Identify other types of common fasteners.
- Identify the types and uses of measuring tools.
- Identify the procedures for the care and use of measuring tools.

- **Identify and explain the safe and proper use of power tools and shop equipment**

- Identify the types and uses of pneumatic, hydraulic, and electric power tools.
- Identify the hazards of power tools.
- Identify the types, purposes, and safety considerations of common shop equipment.
- Demonstrate the ability to:
 - A. Lift a vehicle



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General Suspension and Steering Systems Diagnosis

- **Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. P-1**

Objective

- Identify terms and definitions associated with steering systems
 - Identify the operating principles of the manual rack-and-pinion steering system.
 - Identify the operating principles of the power rack-and-pinion steering system.
 - Identify the operating principles of the speed-sensitive steering system.
 - Identify terms and definitions associated with steering system diagnosis.
 - Identify the procedures for general steering gear road test diagnosis.
 - Identify the causes of and corrections for manual steering gear problems.
 - Identify the causes of and corrections for power steering gear problems.
 - Identify the causes of and corrections for manual rack-and-pinion steering gear problems.
 - Identify the causes of and corrections for power rack-and-pinion steering systems.
 - Identify the procedure for diagnosing electronically controlled steering systems.
 - Identify the procedures for diagnosing and inspecting MacPherson strut suspensions
 - Demonstrate the ability to:
 - A. Diagnose manual and power steering gear problems.
 - B. Test and diagnose components of electronically controlled steering systems using a scan tool.
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- **Identify and interpret suspension and steering concern; determine necessary action. P-1**
- #### **Objective**
- Identify terms and definitions associated with steering systems
 - Identify the operating principles of the manual rack-and-pinion steering system.
 - Identify the operating principles of the power rack-and-pinion steering system.
 - Identify the operating principles of the speed-sensitive steering system.
 - Identify terms and definitions associated with steering system diagnosis.
 - Identify the procedures for general steering gear road test diagnosis.
 - Identify the causes of and corrections for manual steering gear problems.
 - Identify the causes of and corrections for power steering gear problems.
 - Identify the causes of and corrections for manual rack-and-pinion steering gear problems.
 - Identify the causes of and corrections for power rack-and-pinion steering systems.
 - Identify the procedure for diagnosing electronically controlled steering systems.
 - Identify the procedures for diagnosing and inspecting MacPherson strut suspensions
 - Demonstrate the ability to:
 - A. Diagnose manual and power steering gear problems.
 - B. Test and diagnose components of electronically controlled steering systems using a scan tool.
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- **Research applicable vehicle and service information, such as suspension and steering system operation, vehicle service history, service precautions, and technical service bulletins. P-1**
- #### **Objective**
- Identify resources available to research vehicle information.



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- **Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals). P-1**

Objective

- Identify areas on the vehicle where identification numbers may be located.

Steering Systems Diagnosis and Repair

- **Diagnose power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, noise, and fluid leakage concerns; determine necessary action. P-3**

Objective

- Identify the procedures for checking and adjusting manual steering fluid levels.
- Identify procedures for inspecting the condition and level of fluids in conventional power steering and power rack-and-pinion steering systems.
- Identify procedures for bleeding a power steering system.
- Identify the procedures for diagnosing leaks in power steering pumps.
- Identify the procedures for diagnosing leaks on a conventional power steering gear.
- Identify the procedures for diagnosing fluid leaks in power rack-and-pinion systems.
- Identify the procedures for diagnosing leaks in power steering hoses.
- Identify the equipment needed for testing power steering systems.
- Identify the procedures for hooking up the power steering testing equipment.
- Identify the procedures for checking power steering systems pressure.
- Identify the procedures for servicing power steering hoses.

- **Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering, noise, and fluid leakage concerns; determine necessary action. P-3**

Objective

- Identify the procedures for removing and installing a power steering pump.
- Identify the procedures for servicing power steering hoses.
- Identify the procedures for servicing a power steering pump.

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

Objective

- Identify the procedures for general steering gear road test diagnosis.
- Identify the causes of and corrections for manual steering gear problems.
- Identify the causes of and corrections for power steering gear problems.
- Identify the procedure for removing and installing a manual steering gear.
- Identify the procedures for disassembling and inspecting a manual steering gear.
- Identify the procedures for reassembling and adjusting the steering gear.
- Identify the procedures for removing and installing a power steering gear.
- Identify the procedures for disassembling and inspecting an integral power steering gear.
- Identify the procedures for reassembling an integral power steering gear.
- Identify the procedures for adjusting an integral power steering gear



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- **Adjust manual or power non-rack and pinion worm bearing preload and sector lash. P-3**

Objective

- Identify the procedures for general steering gear road test diagnosis.
- Identify the causes of and corrections for manual rack-and-pinion steering gear problems.
- Identify the causes of and corrections for power rack-and-pinion steering systems.
- Identify the procedures for inspecting the tie-rods on rack-and-pinion steering assemblies.
- Identify the procedures for removing and installing a manual rack-and-pinion steering gear.
- Identify the procedures for disassembling and inspecting a manual rack-and-pinion steering gear.
- Identify the procedures for reassembling the manual rack-and-pinion steering gear.
- Identify the procedures for removing and installing a power rack-and-pinion steering gear.
- Identify the procedures for disassembling and inspecting a power steering gear.
- Identify the procedures for reassembling a power rack-and-pinion steering gear.

- **Remove and reinstall power steering pump. P-3**

Objective

- Identify the procedures for removing and installing a power steering pump.
- Demonstrate the ability to:
 - A. Remove and install a power steering pump.
 - B. Remove and replace a power steering pressure hose.
 - C. Service a power steering pump.
 - D. Remove, inspect, and replace the power steering belt.

- **Remove and reinstall power steering pump pulley; check pulley and belt alignment. P-3**

Objective

- Identify the procedures for removing and installing a power steering gear.
- Identify the procedures for disassembling and inspecting an integral power steering gear.
- Identify the procedures for reassembling an integral power steering gear.
- Identify the procedures for adjusting an integral power steering gear.
- Demonstrate the ability to:
 - A. Remove and install an integral power steering gear.
 - B. Disassemble, clean, and inspect an integral power steering gear.
 - C. Reassemble and adjust an integral power steering gear.

- **Test and diagnose components of electronically controlled steering systems using a scan tool; determine necessary action. P-3**

Objective

- Identify the procedure for diagnosing electronically controlled steering systems.
- Demonstrate the ability to:
 - A. Test and diagnose components of electronically controlled steering systems using a scan tool.



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- **Inspect and test non-hydraulic electric-power assist steering. P-3**
Objective
 - Identify the procedure for diagnosing electronically controlled steering systems.
 - Demonstrate the ability to:
 - A. Test and diagnose components of electronically controlled steering systems.
 - **Identify hybrid vehicle power steering system electrical circuits, service and safety precautions. P-3**
Objective
 - Identify the procedure for diagnosing electronically controlled steering systems.
 - Demonstrate the ability to:
 - A. Test and diagnose components of electronically controlled steering systems.

Suspension Systems Diagnosis and Repair

Front Suspension

- **Remove, inspect, and install upper and lower control arms, bushings, shafts, and rebound bumpers. P-3**
Objective
 - Identify the procedures for servicing lower control arms.
 - Identify the procedures for replacing upper control arms, cross shafts, and bushings.
 - Demonstrate the ability to:
 - A. Inspect and replace upper control arms and bushings.
 - B. Inspect and replace lower control arms and bushings.
- **Remove, inspect, install, and adjust suspension system torsion bars; inspect mounts. P-3**
Objective
 - Identify the procedures for servicing lower control arms.
 - Demonstrate the ability to:
 - A. Inspect and replace torsion bar springs.

Rear Suspension

- **Remove, inspect, and install leaf springs, leaf spring insulators (silencers), shackles, brackets, bushings, and mounts. P-3**
Objective
 - Identify the procedures for inspecting and replacing leaf springs.
 - Demonstrate the ability to:
 - A. Inspect and replace rear leaf springs.

Miscellaneous Service

Test and diagnose components of electronically controlled suspension systems using a scan tool; determine necessary action. P-3

Objective

- Identify the characteristics and operating principles of electronic level control systems.
- Identify the characteristics and operating principles of electronic air suspension systems.
- Identify the procedures for diagnosing electronically controlled suspension systems.



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- Identify the procedures for diagnosing electronic level control components.
- Identify the procedures for repairing and replacing electronic level control components.
- Demonstrate the ability to:
 - A. Test electronic level control performance.
 - B. Leak test an electronic level control system.
 - C. Remove and install an electronic level control compressor.
 - D. Test an electronic level control height sensor.
 - E. Test and diagnose components of electronically controlled suspension systems using a scan tool.

- **Disable and enable supplemental restraint system (SRS). P-1**
Objective
 - Identify the procedures for identifying vehicles equipped with a supplemental restraint system (SRS).
 - Identify the procedures for disabling the SRS.
 - Identify the procedures for enabling the SRS.

- **Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil (clock spring). P-1**
Objective
 - Identify the procedures for diagnosing steering column problems.
 - Identify the procedures for removing and reinstalling a steering column.
 - Identify the procedures for servicing a steering column.

- **Remove and replace manual or power rack and pinion steering gear; inspect mounting bushings and brackets. P-1**
Objective
 - Identify the procedures for visually inspecting the linkage.
 - Identify the procedures for steering linkage inspection.
 - Identify the tools and procedures for breaking tapered fits between steering linkage components.
 - Identify the procedures for lubricating steering linkage components.
 - Identify the procedures for removing and installing a pitman arm.
 - Identify the procedures for removing and installing an idler arm.
 - Identify the procedures for removing and installing tie-rod ends.
 - Identify the procedures for removing and installing a center link.
 - Identify the procedures for removing and installing a steering dampener.
 - Identify the procedures for removing and installing a power steering control valve on a linkage-type power steering system.
 - Identify the procedures for removing and installing a power cylinder on a linkage - type power steering system.
 - Identify the procedures for inspecting the tie-rods on rack-and-pinion steering assemblies.
 - Identify the procedures for removing and installing a manual rack-and-pinion steering gear.
 - Identify the procedures for disassembling and inspecting a manual rack-and-pinion steering gear.
 - Identify the procedures for reassembling the manual rack-and-pinion steering gear.



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- **Inspect and replace manual or power rack and pinion steering gear inner tie rod ends (sockets) and bellows boots. P-1**

Objective

- Identify the basic steering linkage designs used on manual and power steering systems.
 - Identify power and manual rack-and-pinion steering components.
 - Identify the operating principles of the manual rack-and-pinion steering system.
 - Identify the operating principles of the power rack-and-pinion steering system.
 - Identify the operating principles of the speed-sensitive steering system.
 - Identify the proportional rack-and-pinion power steering system.
 - Identify the procedures for general steering gear road test diagnosis.
 - Identify the causes of and corrections for manual steering gear problems.
 - Identify the causes of and corrections for power steering gear problems.
 - Identify the causes of and corrections for manual rack-and-pinion steering gear problems.
 - Identify the causes of and corrections for power rack-and-pinion steering systems.
 - Identify terms and definitions associated with steering linkage replacement and repair.
 - Identify the procedures for visually inspecting the linkage.
 - Identify the procedures for steering linkage inspection.
 - Identify the procedures for removing and installing tie-rod ends.
 - Identify the procedures for inspecting the tie-rods on rack-and-pinion steering assemblies.
 - Identify the procedures for removing and installing a manual rack-and-pinion steering gear.
 - Identify the procedures for disassembling and inspecting a manual rack-and pinion steering gear.
 - Identify the procedures for reassembling the manual rack-and-pinion steering gear.
 - Identify the procedures for removing and installing a power rack-and-pinion steering gear.
 - Identify the procedures for disassembling and inspecting a power steering gear.
 - Identify the procedures for reassembling a power rack-and-pinion steering gear.
 - Demonstrate the ability to:
 - A. Inspect and replace rack-and-pinion inner tie-rods and bellows boots
 - B. Remove and install tie-rods.
 - C. Remove and install a manual rack-and-pinion steering gear.
 - D. Disassemble, clean, and inspect a manual rack-and-pinion steering gear.
 - E. Reassemble and adjust a manual rack-and-pinion steering gear.
 - F. Remove and install a power rack-and-pinion steering gear.
 - G. Disassemble, clean, and inspect a power rack-and-pinion steering gear
 - H. Reassemble and adjust a power rack-and-pinion steering gear.
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- **Determine proper power steering fluid type; inspect fluid level and condition. P-1**
- Objective**
- Identify terms and definitions associated with steering system diagnosis.
 - Identify the equipment needed for testing power steering systems.
 - Identify procedures for inspecting the condition and level of fluids in conventional power steering and power rack-and-pinion steering systems.



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

Objective

- Identify procedures for inspecting the condition and level of fluids in conventional power steering and power rack-and-pinion steering systems.
- Identify procedures for bleeding a power steering system.
- Demonstrate the ability to:
 - A. Inspect and adjust lubricant level in manual steering gear.
 - B. Inspect and adjust power steering fluid level.

- **Diagnose power steering fluid leakage; determine necessary action. P-2**

Objective

- Identify the procedures for diagnosing leaks in power steering pumps.
- Identify the procedures for diagnosing leaks on a conventional power steering gear.
- Identify the procedures for diagnosing fluid leaks in power rack-and-pinion systems.
- Identify the procedures for diagnosing leaks in power steering hoses
- Demonstrate the ability to:
 - A. Diagnose fluid leaks in the power steering system.

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

Objective

- Identify the procedures for removing and installing a power steering pump.
- Demonstrate the ability to:
 - A. Remove and install a power steering pump.
 - B. Remove, inspect, and replace the power steering belt.

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

Objective

- Identify the procedures for removing and installing a power steering pump.
- Identify the procedures for servicing power steering hoses.
- Identify the procedures for servicing a power steering pump.
- Demonstrate the ability to:
 - A. Remove and install a power steering pump.
 - B. Remove and replace a power steering pressure hose.
 - C. Service a power steering pump.
 - D. Remove, inspect, and replace the power steering belt.

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

Objective

- Identify terms and definitions associated with steering linkage replacement and repair.
- Identify the procedures for visually inspecting the linkage.
- Identify the procedures for steering linkage inspection.
- Identify the tools and procedures for breaking tapered fits between steering linkage components.
- Identify the procedures for lubricating steering linkage components.
- Identify the procedures for removing and installing a pitman arm.
- Identify the procedures for removing and installing an idler arm.
- Identify the procedures for removing and installing a center link.



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- Identify the procedures for removing and installing a steering dampener.
- Demonstrate the ability to:

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- A. Remove and install a pitman arm.
 - B. Remove and install an idler arm.
 - C. Remove and install a center link.

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

- Identify terms and definitions associated with steering linkage replacement and repair.
- Identify the procedures for visually inspecting the linkage.
- Identify the procedures for steering linkage inspection.
- Identify the tools and procedures for breaking tapered fits between steering linkage components.
- Identify the procedures for lubricating steering linkage components.
- Identify the procedures for removing and installing tie-rod ends.
- Demonstrate the ability to:
 - A. Remove and install tie-rods.

Suspension Systems Diagnosis and Repair

Front Suspension

- **Diagnose short and long arm suspension system noises, body sway, and uneven riding height concerns; determine necessary action. P-1**

Objective

- Identify terms and definitions related to front suspension systems.
- Identify the basic components and design of a suspension system.
- Identify terms and definitions related to an SLA suspension.
- Identify the procedures for determining vehicle ride height.
- Identify the procedures for inspecting load-carrying and non-load-carrying ball joints.
- Identify the procedures for lubricating a suspension and steering system.
- Demonstrate the ability to:
 - A. Diagnose short-and long-arm (SLA).
 - B. Lubricate a steering and suspension system.

- **Diagnose strut suspension system noises, body sway, and uneven riding height concerns; determine necessary action. P-1**

Objective

- Identify the characteristics of a conventional MacPherson strut front suspension.
- Identify the characteristics of a modified MacPherson strut suspension.
- Identify the procedures for determining vehicle ride height.
- Identify the basic components of MacPherson struts.
- Identify the procedures for diagnosing and inspecting MacPherson strut suspensions.
- Identify the procedure for servicing MacPherson struts.
- Identify the procedures for servicing modified MacPherson struts.
- Demonstrate the ability to:
 - A. Inspect, remove, repair, and install MacPherson strut assemblies



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- **Remove, inspect and install strut rods (compression/tension) and bushings. P-2**
Objective
 - Identify the procedures for inspecting and replacing strut rods and bushings.
 - Demonstrate the ability to:
 - A. Inspect and replace strut rods and bushings.

 - **Remove, inspect, and install upper and/or lower ball joints. P-1**
Objective
 - Identify the procedures for replacing the ball joint.
 - Demonstrate the ability to:
 - A. Inspect and replace ball joints.

 - **Remove, inspect, and install steering knuckle assemblies. P-2**
Objective
 - Identify the function of the energy-absorbing steering column.
 - Identify the four principal components of an energy-absorbing steering column.
 - Identify the procedures for diagnosing steering column problems.
 - Identify the procedures for removing and reinstalling a steering column.
 - Identify the procedures for servicing a steering column.
 - Demonstrate the ability to:
 - A. Diagnose steering column problems and remove and install an energy-absorbing steering column.
 - B. Disassemble, inspect, and reassemble an energy-absorbing steering column.

 - **Remove, inspect, and install short and long arm suspension system coil springs and spring insulators. P-3**
Objective
 - Identify the procedures for determining vehicle ride height.
 - Identify the procedures for inspecting load-carrying and non-load-carrying ball joints.
 - Identify the procedures for lubricating a suspension and steering system.
 - Identify the procedures for inspecting coil springs.
 - Identify the procedures for replacing the coil spring mounted on the lower control arm.
 - Identify the procedures for removing and installing the coil spring mounted on the upper control arm.
 - Demonstrate the ability to:
 - A. Diagnose short-and long-arm (SLA).
 - B. Lubricate a steering and suspension system.
 - C. Inspect and replace coil springs.

 - **Remove, inspect, and install stabilizer bar bushings, brackets, and links. P-2**
Objective
 - Identify the procedures for inspecting and replacing the stabilizer bar and bushings.
 - Identify the procedures for replacing torsion bar springs.
 - Demonstrate the ability to:
 - A. Inspect and replace stabilizer bars and bushings.
 - B. Inspect and replace torsion bar springs.



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- **Remove, inspect, and install strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount. P-1**

Objective

- Identify the basic components of MacPherson struts.
- Identify the procedures for diagnosing and inspecting MacPherson strut suspensions.
- Identify the procedure for servicing MacPherson struts.
- Identify the procedures for servicing modified MacPherson struts.
- Demonstrate the ability to:
 - A. Inspect, remove, repair, and install MacPherson strut assemblies.

- **Lubricate suspension and steering systems. P-2**

Objective

- Identify the procedures for lubricating a suspension and steering system.
- Demonstrate the ability to:
 - B. Lubricate a steering and suspension system.

Rear Suspension

- **Remove, inspect, and install coil springs and spring insulators. P-2**

Objective

- Identify the basic characteristics of rear-wheel-drive coil spring rear suspension systems.
- Identify the basic characteristics of rear-wheel-drive coil spring rear suspension systems.
- Identify the procedures for inspecting and replacing coil springs.
- Demonstrate the ability to:
 - B. Inspect and replace rear coil springs and insulators.

- **Remove, inspect, and install transverse links, control arms, bushings, and mounts. P-2**

Objective

- Identify the basic characteristics of rear suspension systems
- Identify the basic characteristics of trailing arm rear suspension systems.
- Identify the basic characteristics of semi-independent rear suspension systems.
- Identify the procedures for inspecting and replacing rear suspension control arms.
- Demonstrate the ability to:
 - A. Remove, inspect, and install transverse spring systems.
 - B. Inspect and replace rear suspension control arms and bushings

- **Remove, inspect, and install strut cartridge or assembly, strut coil spring, and insulators (silencers). P-2**

Objective

- Identify the basic characteristics of rear suspension systems.
- Identify the basic characteristics of the MacPherson strut rear suspension systems.



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Miscellaneous Service

- **Inspect, remove, and replace shock absorbers. P-1**

Objective

- Identify the characteristics of the design of the air adjustable shock absorber.
- Identify the characteristics and operating principles of electronic level control systems.
- Identify the characteristics and operating principles of electronic air suspension systems.
- Identify the procedures for inspecting air adjustable shock absorbers.
- Identify the procedures for replacing air adjustable shock absorbers.
- Identify the procedures for repairing air lines.
- Identify the procedures for diagnosing electronically controlled suspension systems.
- Identify the procedures for diagnosing electronic level control components.
- Identify the procedures for repairing and replacing electronic level control components.
- Demonstrate the ability to:
 - A. Inspect and replace air adjustable shock absorbers.
 - B. Test electronic level control performance.
 - C. Leak test an electronic level control system.
 - D. Remove and install an electronic level control compressor.
 - E. Test an electronic level control height sensor.
 - F. Test and diagnose components of electronically controlled suspension systems using a scan tool.

- **Remove, inspect, and service or replace front and rear wheel bearings. P-1**

Objective

- Identify the procedures for maintaining wheel bearings.
- Identify the procedures for servicing and adjusting wheel bearings.
- Identify the procedures for inspecting and servicing non-sealed wheel bearings.
- Identify the procedures for adjusting non-sealed wheel bearings and tightening sealed wheel bearings.
- Identify the procedures for inspecting and servicing sealed wheel bearings.
- Identify the procedures for inspecting and replacing a spindle.
- Demonstrate the ability to:
 - A. Service non-sealed tapered roller wheel bearings.
 - B. Remove and install sealed wheel bearings: front-wheel-drive vehicles.
 - C. Remove and install a wheel spindle on short-and long-arm suspensions.
 - D. Remove, inspect, and install steering knuckle assemblies.

Wheel and Tire Diagnosis and Repair

- **Diagnose tire wear patterns; determine necessary action. P-1**

Objective

- Identify the basic characteristics of an automobile tire.
- Identify the basic components of a tire.
- Identify the three basic types of passenger car tire construction.
- Identify the various ways that tires are graded.
- Identify the characteristics of tire sizing.
- Identify the characteristics of convenience spare tires.



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- Identify the characteristics of wheel construction.
 - Identify the procedures for inspecting tires.
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- **Inspect tires; check and adjust air pressure. P-1**

Objective

- Demonstrate the ability to:
 - A. Inspect and inflate tires.

- **Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action. P-2**

Objective

- Identify the causes of vibration at highway speeds.
- Identify the characteristics and causes of wheel shimmy.
- Identify the characteristics of rough or damaged wheel bearings.
- Identify the characteristics and causes of wander.
- Identify the characteristics and causes of lateral pull.
- Identify the characteristics and causes of hard steering.

- **Rotate tires according to manufacturer's recommendations. P-1**

Objective

- Demonstrate the ability to:
 - A. Rotate tires.

- **Measure wheel, tire, axle, and hub run-out; determine necessary action. P-2**

Objective

- Identify the procedures for testing the radial runout of a wheel-and-tire assembly.
- Identify the procedures for testing the lateral runout of a wheel-and-tire assembly.
- Identify the procedures for checking the lateral and radial runout of a wheel.
- Demonstrate the ability to:
 - A. Measure a wheel-and-tire assembly for radial and lateral runout

- **Diagnose tire pull (lead) problem; determine necessary action. P-2**

Objective

- Identify the procedures for match mounting a wheel-and-tire assembly.
- Identify the procedures for balancing a wheel-and-tire assemble.
- Demonstrate the ability to:
 - A. Measure a wheel-and-tire assembly for radial and lateral runout
 - B. Balance wheel-and-tire assemblies.

- **Balance wheel and tire assembly (static and dynamic). P-1**

Objective

- Identify the differences between static and dynamic balance.
- Identify the characteristics of wheel runout.
- Identify the procedures for match mounting a wheel-and-tire assembly.
- Identify the procedures for balancing a wheel-and-tire assemble.
- Demonstrate the ability to:
 - A. Measure a wheel-and-tire assembly for radial and lateral runout
 - B. Balance wheel-and-tire assemblies



Wayne County Community College District

COURSE SYLLABUS

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- **Dismount, inspect, and remount tire on wheel. P-2**
Objective
 - Identify the procedures for dismounting tires.
 - Identify the procedures for mounting tires.
 - Demonstrate the ability to:
 - A. Dismount and mount tires.

 - **Dismount, inspect, and remount tire on wheel equipped with tire pressure sensor. P-3**
Objective
 - Identify the procedures for dismounting tires.
 - Identify the procedures for mounting tires.
 - Demonstrate the ability to:
 - A. Dismount and mount tires.

 - **Reinstall wheel; torque lug nuts. P-1**
Objective
 - Identify the procedures for dismounting tires.
 - Identify the procedures for mounting tires.
 - Identify the procedures for repairing tubeless tires.
 - Demonstrate the ability to:
 - A. Dismount and mount tires.
 - B. Repair punctures in tubeless tires.

 - **Inspect tire and wheel assembly for air loss; perform necessary action. P-1**
Objective
 - Identify the procedures for dismounting tires.
 - Identify the procedures for mounting tires.
 - Identify the procedures for repairing tubeless tires.
 - Demonstrate the ability to:
 - A. Dismount and mount tires.
 - B. Repair punctures in tubeless tires.

 - **Repair tire using internal patch. P-1**
Objective
 - Identify the procedures for dismounting tires.
 - Identify the procedures for mounting tires.
 - Identify the procedures for repairing tubeless tires.
 - Demonstrate the ability to:
 - A. Dismount and mount tires.
 - B. Repair punctures in tubeless tires.

 - **Inspect, diagnose, and calibrate tire pressure monitoring system. P-3**
Objective
 - Identify the procedures for dismounting tires.
 - Identify the procedures for mounting tires.
 - Identify the procedures for repairing tubeless tires.
 - Demonstrate the ability to:
 - A. Dismount and mount tires.
 - B. Repair punctures in tubeless tires.



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COURSE SYLLABUS

ASSESSMENT METHODS:

Student performance may be assessed by examination, quizzes, case studies, oral conversation, group discussion, oral presentations. The instructor reserves the option to employ one or more of these assessment methods during the course.

GRADING SCALE:

90%-100% = A

80%-89.9% = B

70%-79.9% = C

60%-69.9% = D

<60% = E