

# STRANDS AND STANDARDS

## ASE CHASSIS - MLR



### Course Description

This course is the first part of a sequence that prepares individuals to engage in the servicing and maintenance of all types of automobiles. Instruction includes training in the Maintenance and Light Repair of automobiles, specifically shop safety, transmission/transaxle, brakes, and steering & suspension. This course is based on the Automotive Service Excellence (ASE) task list. Work ethics and productivity are an integral part of the classroom and lab activities of this course. The most current information can be found at the AST Task List at the following address: <https://www.aseeducationfoundation.org/resources>

<b>Intended Grade Level</b>	11-12
Units of Credit	0.5
Core Code	40.09.00.00.021
Concurrent Enrollment Core Code	40.09.00.13.021
Prerequisite	Automotive Introduction
Skill Certification Test Number	
Test Weight	
<b>License Area of Concentration</b>	CTE and/or Secondary Education 6-12
<b>Required Endorsement(s)</b>	
Endorsement 1	Automotive
Endorsement 2	N/A
Endorsement 3	N/A

## 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 (CO<sub>2</sub>), hydrocarbons (HC), oxides of nitrogen (NO<sub>x</sub>), and carbon monoxide (CO).
- HC, NO<sub>x</sub>, 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 understand, inspect, diagnose, and service the basics of transmissions and transaxles.**

**Standard 1**

Students will conduct General Research.

- 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).

- Identify automatic transmission and transaxle components and configurations.
- Retrieve and record DTCs, OBD monitor status, and freeze frame data; clear codes and data when directed.
- Inspect transmission fluid condition; check fluid level; inspect for leaks on transmission or transaxle equipped with a dipstick.
- Inspect transmission fluid condition; check fluid level; inspect for leaks on transmission or transaxle not equipped with a dipstick.
- Demonstrate knowledge of transmission/transaxle gear reduction/multiplication operation using driving, driven, and held member (power flow) principles.
- Demonstrate knowledge of hydraulic principles (Pascal's Law) in a transmission/transaxle.

## Standard 2

Students will identify and inspect In-Vehicle Transmission/Transaxles.

- Inspect external manual valve shift linkage, transmission range sensor/switch, and/or park/neutral position switch.
- Drain and replace fluid and filter(s); use proper fluid type per manufacturer specification.
- Demonstrate understanding of relearn procedures.
- Inspect, replace and/or align power train mounts.

## Standard 3

Students will Describe Off-Vehicle Transmission/Transaxle.

- Describe the operational characteristics of a continuously variable transmission (CVT).
- Describe the operational characteristics of a hybrid vehicle drive train.

## Standard 4

Students will inspect the Manual Drive Train and Axles.

- 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).
- Identify manual drive train and axle components and configurations.
- Retrieve and record DTCs, OBD monitor status, and freeze frame data; clear codes and data when directed.
- Check fluid condition; check for leaks.
- Drain and refill manual transmission/transaxle; use proper fluid type per manufacturer specification.

## Standard 5

Students will inspect the Clutch.

- Check and adjust clutch master cylinder fluid level; check for leaks; use proper fluid type per manufacturer specification.

## Standard 6

Students will inspect the Transmission/Transaxle.

- Check and adjust clutch master cylinder fluid level; check for leaks; use proper fluid type per manufacturer specification.

**Standard 7**

Students will inspect the Drive Shaft, Half Shafts, Universal Joints and Constant-Velocity Joints.

- Inspect and/or remove/replace bearings, hubs, and seals.
- Inspect and/or service/replace shafts, yokes, boots, and universal/CV joints.
- Check for leaks at drive assembly and transfer case seals; check vents; check fluid level; use proper fluid type per manufacturer specification.

**Standard 8**

Students will generally inspect the Differential and Drive Axles.

- Inspect differential housing; check for leaks; inspect housing vent.
- Check and adjust differential housing fluid level; use proper fluid type per manufacturer specification.
- Drain and refill differential housing; using proper fluid type per manufacturer specification.
- Inspect and replace drive axle wheel studs.

**Standard 9**

Students will discuss the Four-wheel Drive/All-wheel Drive issues.

- Identify concerns related to variations in tire circumference and/or final drive ratios.

**Performance Skills**

- Students will conduct General Research.
- Students will identify and inspect In-Vehicle Transmission/Transaxles.
- Students will Describe Off-Vehicle Transmission/Transaxle.
- Students will inspect the Manual Drive Train and Axles.
- Students will inspect the Clutch.
- Students will inspect the Transmission/Transaxle.
- Students will inspect the Drive Shaft, Half Shafts, Universal Joints and Constant-Velocity Joints.
- Students will generally inspect the Differential and Drive Axles.
- Students will discuss the Four-wheel Drive/All-wheel Drive issues.

**STRAND 5**

**Students will be able to understand, inspect, diagnose, and service the Suspension and Steering Systems.**

**Standard 1**

Students will conduct General Research

- 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).
- Identify suspension and steering system components and configurations.
- Retrieve and record DTCs, OBD monitor status, and freeze frame data; clear codes and data when directed.
- Disable and enable supplemental restraint system (SRS); verify indicator lamp operation.

**Standard 2**

Students will inspect the Steering Systems.

- 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; use proper fluid type per manufacturer specification.

- 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 pitman arm, relay (centerlink/intermediate) rod, idler arm, mountings, and steering linkage damper.
- Inspect tie rod ends (sockets), tie rod sleeves, and clamps (non-rack and pinion).
- Inspect electric power steering system.

### Standard 3

Students will inspect the Suspension Systems.

- Inspect upper and/or lower control arms, bushings, and shafts.
- Inspect and replace rebound/jounce bumpers.
- Inspect track bar, strut rods/radius arms, and related mounts and bushings.
- Inspect upper and/or lower ball joints (with or without wear indicators).
- Inspect suspension system coil springs and spring insulators.
- Inspect torsion bars and mounts.
- Inspect 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 components of suspension systems (Coil, Leaf, and Torsion).
- Inspect components of electronically controlled suspension systems.

### Standard 4

Students will conduct related Suspension and Steering Service.

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

### Standard 5

- Perform pre-alignment inspection; measure vehicle ride height.
- Describe four-wheel alignment angles (camber, caster, and toe) and effects on vehicle handling\tire wear.

### Standard 6

- 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 recommendations including vehicles equipped with tire pressure monitoring systems (TPMS).
- Dismount, inspect, and remount tire on wheel (with/without TPMS); balance wheel and tire assembly.
- Inspect tire and wheel assembly for air loss; determine needed action.
- 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.

## Performance Skills

- Students will inspect the Steering Systems.
- Students will inspect the Suspension Systems.
- Students will conduct related Suspension and Steering Service.
- Students will inspect the Wheel Alignment.
- Students will inspect and service the Wheels and Tires.

## STRAND 6

**Students will understand, inspect, diagnose, and service the basics of the Brake Systems.**

### Standard 1

Students will conduct general research.

- 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).
- Identify brake system components and configurations.
- Retrieve and record DTCs, OBD monitor status, and freeze frame data; clear codes and data when directed.
- Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS).
- Install wheel and torque lug nuts.

### Standard 2

Students will inspect and service the Hydraulic Brake System.

- Demonstrate understanding of hydraulic principals (Pascal's law).
- Describe proper brake pedal height, travel, and feel.
- Check master cylinder for proper operation.
- Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, and loose fittings/supports.
- Select, handle, store, and fill brake fluids to proper level; use proper fluid type per manufacturer specification.
- Identify components of hydraulic brake warning light system.
- Bleed and/or replace fluid in the brake system.
- Test brake fluid for contamination.

### Standard 3

Students will inspect and service Drum Brakes.

- Remove, clean, and inspect brake drum; measure brake drum diameter; determine serviceability.
- Refinish brake drum and measure final drum diameter; compare with specification.
- Remove, clean, inspect, and/or replace brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.
- Inspect wheel cylinders for leaks and proper operation; remove and replace as needed.
- Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; perform final checks and adjustments.

### Standard 4

- Remove and clean caliper assembly; inspect for leaks and damage, and wear.
- Inspect caliper mounting and slides/pins for proper operation, wear, and damage.
- Remove, inspect, and/or replace brake pads and retaining hardware.
- Lubricate and reinstall caliper, brake pads, and related hardware; seat brake pads against rotor; inspect for leaks.
- Clean and inspect rotor and mounting surface, measure rotor thickness, thickness variation, and lateral runout.
- Remove and reinstall/replace rotor.
- Refinish rotor on vehicle; measure final rotor thickness and compare with specification.
- Refinish rotor off vehicle; measure final rotor thickness and compare with specification.
- Retract and re-adjust caliper piston on an integrated parking brake system.
- Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendation.

### Standard 5

Students will inspect Power-Assist Units.

- Check brake pedal travel with and without engine running to verify proper power booster operation.
- Identify components of the brake power assist system (vacuum/ hydraulic/electric).

### Standard 6

Students will inspect the braking Related Systems (i.e. Wheel Bearings, Parking Brakes, Electrical).

- Remove, clean, inspect, repack/replace, and install wheel bearings; remove and install bearing races; replace seals; install hub and adjust bearings.
- Check parking brake system components for wear, binding, and corrosion; clean, lubricate, adjust and/or replace as needed.
- Check parking brake operation (including electric parking brakes); check parking brake indicator light system operation.
- Check operation of brake stop light system.
- Inspect and replace wheel studs.

### Standard 7

Students will inspect the Electronic Brake Control Systems: Antilock Brake, Traction Control, and Electronic Stability Control Systems.

- Identify electronic brake control system components and describe function (ABS, TCS, ESC).
- Describe the operation of a regenerative braking system.

### Performance Skills

- Students will inspect and service the Hydraulic Brake System.
- Students will inspect and service Drum Brakes.
- Students will inspect and service Disc Brakes.
- Students will inspect Power-Assist Units.
- Students will inspect the braking Related Systems (i.e. Wheel Bearings, Parking Brakes, Electrical).
- Students will inspect the Electronic Brake Control Systems: Antilock Brake, Traction Control, and Electronic Stability Control Systems.