

STRANDS AND STANDARDS

ASE ENGINE MLR



Course Description

This is an advanced-level course in Automotive Service that deals with the engine and related components. Through demonstrations, lectures, research and practical experiences dealing with the engine, this course is designed to assist students in broadening their experience, through the use of equipment, tools, materials, processes and techniques in inspecting, diagnosing, and servicing of automobiles. The most current information can be found at the MLR Task List at the following address: <https://www.asealliance.org/natef-accreditation/program-standards>.



Intended Grade Level	11-12
Units of Credit	0.5
Core Code	40.09.00.00.026
Concurrent Enrollment Core Code	40.09.00.13.026
Prerequisite	Introduction to Automotive
Skill Certification Test Number	N/A
Test Weight	N/A
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Automotive Service
Endorsement 2	N/A
Endorsement 3	N/A

STRAND 1

Students will be able to understand general shop safety.

Standard 1

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

- Personal safety.
 - Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits.
 - Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.).
- Tool and equipment safety.
- Workplace safety.

Standard 2

Comply with safety rules for working with automotive chemicals.

- Chemical manufacturers provide a Material Safety Data Sheets (MSDS) for each chemical they produce.
- Store 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 (NO_x), and carbon monoxide (CO).
- HC, NO_x, and CO can pose health and environmental problems if they are not controlled.
- All refrigerants must be recovered, there are no exceptions. Venting refrigerants to the atmosphere is illegal.

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.
- Use a vacuum source or flush with water.

Performance Skill

Understand general shop safety.

- Learn safe working habits and procedures. 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 2

Students will be able to understand, inspect, diagnose, and service the basics of engine repair.

Standard 1

General engine repair.

- Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins.
- Verify operation of the instrument panel engine warning indicators.
- Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.
- Install engine covers using gaskets, seals, and sealers as required.
- Verify engine mechanical timing.
- Perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert.
- Identify service precautions related to service of the internal combustion engine of a hybrid vehicle.

Standard 2

Cylinder head and valve train.

- Adjust valves (mechanical or hydraulic lifters).
- Identify components of the cylinder head and valve train.

Standard 3

Lubrication and cooling systems.

- Remove, inspect, and replace thermostat and gasket/seal.
- Inspect and test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required.

Performance Skill

Understand, inspect, diagnose, and service the basics of engine repair.

- General engine repair.
- Cylinder head and valve train.
- Lubrication and cooling systems.

STRAND 3

Students will be able to understand, inspect, diagnose, and service the basics of electrical/electronic systems.

Standard 1

General electrical/electronics.

- Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law).
- Use wiring diagrams to trace electrical/electronic circuits.
- Demonstrate proper use of a digital multi-meter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance.
- Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits.
- Check operation of electrical circuits with a test light.
- Check operation of electrical circuits with fused jumper wires.
- Measure key-off battery drain (parasitic draw).
- Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.
- Perform solder repair of electrical wiring.
- Replace electrical connectors and terminal ends.

Standard 2

Battery service.

- Confirm proper battery capacity for vehicle application; perform battery capacity test; determine necessary action.
- Maintain or restore electronic memory functions.
- Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs.
- Perform slow/fast battery charge according to manufacturer's recommendations.
- Identify high-voltage circuits of electric or hybrid electric vehicle and related safety precautions.
- Identify electronic modules, security systems, radios, and other accessories that require re-initialization or code entry after reconnecting vehicle battery.
- Identify hybrid vehicle auxiliary (12v) battery service, repair, and test procedures.

Standard 3

Starting system.

- Perform starter current draw test; determine necessary action.
- Perform starter circuit voltage drop tests; determine necessary action.
- Inspect and test starter relays and solenoids; determine necessary action.
- Remove and install starter in a vehicle.
- Inspect and test switches, connectors, and wires of starter control circuits; determine necessary action.

Standard 4

Charging system.

- Perform charging system output test; determine necessary action.
- Inspect, adjust, or replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment.
- Remove, inspect, and reinstall generator (alternator).
- Perform charging circuit voltage drop tests; determine necessary action.

Standard 5

Lighting system.

- Aim headlights.
- Identify system voltage and safety precautions associated with high-intensity discharge headlights.

Standard 6

Accessories

- Disable and enable airbag system for vehicle service; verify indicator lamp operation.
- Remove and reinstall door panel.
- Describe the operation of keyless entry/remote-start systems.
- Verify operation of instrument panel gauges and warning/indicator lights; reset maintenance indicators.
- Verify windshield wiper and washer operation; replace wiper blades.

Performance Skill

Understand, inspect, diagnose, and service the basics of electrical/electronic systems.

- General electrical/electronics.
- Battery service.
- Starting system.
- Charging system.
- Lighting system.
- Accessories

STRAND 4

Students will be able to understand, inspect, diagnose, and service heating and air conditioning systems.

Standard 1

Refrigeration system components.

- Inspect and replace A/C compressor drive belts, pulleys, and tensioners; determine necessary action.
- Identify hybrid vehicle A/C system electrical circuits and the service/safety precautions.
- Inspect A/C condenser for airflow restrictions; determine necessary action.

Standard 2

Operating systems and related controls.

- Inspect A/C-heater ducts, doors, hoses, cabin filters, and outlets; perform necessary action.
- Identify the source of A/C system odors.

Performance Skill

Understand, inspect, diagnose, and service heating and air conditioning systems.

- Refrigeration system components.
- Operating systems and related controls.

STRAND 5

Students will be able to understand, inspect, diagnose, and service basic engine performance systems.

Standard 1

General engine performance.

- Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.
- Perform cylinder power balance test; determine necessary action.
- Perform cylinder cranking and running compression tests; determine necessary action.
- Perform cylinder leakage test; determine necessary action.
- Verify engine operating temperature.
- Remove and replace spark plugs; inspect secondary ignition components for wear and damage.

Standard 2

Computerized controls.

- Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.
- Describe the importance of operating all OBDII monitors for repair verification.

Standard 3

Fuel, air induction, and exhaust systems.

- Replace fuel filter(s).
- Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; determine necessary action.
- Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; repair or replace as needed.
- Check and refill diesel exhaust fluid (DEF).

Performance Skill

Understand, inspect, diagnose, and service basic engine performance systems.

- General engine performance.
- Computerized controls.
- Fuel, air induction, and exhaust systems.

STRAND 6

Students will understand the importance of career readiness skills as it relates to the workplace and outlined in the SkillsUSA Framework – Level 2.

Standard 1

Understand and demonstrate reliability.

- Determine individual time management skills.
- Explore what's ethical in the workplace or school.
- Demonstrate awareness of government.
- Demonstrate awareness of professional organizations and trade unions.

Standard 2

Understand and demonstrate responsiveness.

- Define the customer.
- Recognize benefits of doing a community service project.
- Demonstrate social etiquette.
- Identify customer expectations.

Standard 3

Understand resiliency.

- Discover self-motivation techniques and establish short-term goals.
- Select characters of a positive image.
- Identify a mentor.

Standard 4

Understand and demonstrate workplace habits.

- Participate in a shadowing activity.
- Explore workplace ethics: codes of conduct.
- Recognize safety issues.

- Perform a skill demonstration.
- Exercise your right to know.

Standard 5

Understand and develop initiative.

- Develop personal financial skills.
- Develop a business plan.
- Investigate entrepreneurship opportunities.

Standard 6

Understand and demonstrate continuous improvement.

- Conduct a worker interview.
- Demonstrate evaluation skills.
- Examine ethics and values in the workplace.
- Develop a working relationship with a mentor.
- Construct a job search network.

STRAND 7

Students will understand the importance of career readiness skills as it relates to the workplace and outlined in the SkillsUSA Framework – Level 3.

Standard 1

Understand and develop collaboration skills.

- Develop a working relationship with a mentor.
- Apply supervisory skills.
- Manage a project and evaluate others.

Standard 2

Understand and demonstrate change management skills.

- Evaluate your career and training goals.
- Identify and apply conflict resolution skills.
- Illustrate an organizational structure.
- Plan and implement a leadership project.

Standard 3

Understand how customer service applies to the workplace.

- Serve as a volunteer in the community.
- Examine workplace ethics: the role of values in making decisions.
- Understand the cost of customer service.
- Develop customer service skills.
- Maximize customer service skills.

Standard 4

Understand and demonstrate career readiness.

- Market your career choice.
- Research resume writing.
- Demonstrate interviewing skills.
- Predict employment trends.
- Re-evaluate career goals and establish long-term goals.
- Construct a job search network.
- Evaluate professional competencies.
- Analyze your entry-level job skills.
- Design and present a lesson plan on an aspect of your career choice.
- Write an article for a professional journal in your career area.
- Refine your employment portfolio.