

# STRANDS AND STANDARDS

## ASE ELECTRICAL/ELECTRONICS



### 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 automotive electrical systems. 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>.

<b>Intended Grade Level</b>	10-12
Units of Credit	0.5
Core Code	40-09-00-00-024
Concurrent Enrollment Core Code	40-09-13-00-024
Prerequisite	ASE ENGINE-MLR, ASE CHASSIS-MLR
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 inspect the Base Electrical/Electronic System(s).**

**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 electrical/electronic 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**

Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law).

**Standard 5**

Demonstrate proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow and resistance.

**Standard 6**

Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits

**Standard 7**

Describe types of test lights; use appropriate test light to check operation of electrical circuits as directed per service information.

**Standard 8**

Use fused jumper wires to check operation of electrical circuits per service information.

**Standard 9**

Use wiring diagrams during the diagnosis of electrical/electronic circuit problems.

**Standard 10**

Diagnose the cause(s) of excessive key-off battery drain (parasitic draw); determine needed action.

**Standard 11**

Inspect and test fusible links, circuit breakers, and fuses; determine needed action.

**Standard 12**

Inspect, test, repair, and/or replace components, connectors, terminals, harnesses, and wiring in electrical/electronic systems (including solder repairs); determine needed action.

**Standard 13**

Test and measure circuit using an oscilloscope and/or graphing multimeter (GMM); interpret results; determine needed action.

**Performance Skills**

- Research applicable vehicle and service information.
- Identify electrical/electronic system components and configurations.
- Retrieve and record DTCs, OBD monitor status, and freeze frame data; clear codes and data when directed.
- Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law).

- Demonstrate proper use of a digital multimeter (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.
- Describe types of test lights; use appropriate test light to check operation of electrical circuits as directed per service information.
- Use fused jumper wires to check operation of electrical circuits per service information.
- Use wiring diagrams during the diagnosis of electrical/electronic circuit problems.
- Diagnose the cause(s) of excessive key-off battery drain (parasitic draw).
- Inspect and test fusible links, circuit breakers, and fuses.
- Inspect, test, repair, and/or replace components, connectors, terminals, harnesses, and wiring in electrical/electronic systems (including solder repairs).
- Test and measure circuit using an oscilloscope and/or graphing multimeter (GMM); interpret results.

## STRAND 5

**Students will inspect Batteries (Conventional 12-volt system).**

### Standard 1

Perform battery state-of-charge test; determine needed action.

### Standard 2

Confirm proper battery capacity, size, type, and application for vehicle; perform battery capacity and load test; determine needed action.

### Standard 3

Maintain or restore electronic memory functions as recommended by manufacturer.

### Standard 4

Inspect and clean battery; fill battery cells (if applicable); check battery cables, connectors, clamps, and hold-downs.

### Standard 5

Perform battery charging according to manufacturer's recommendations.

### Standard 6

Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply.

### Standard 7

Identify electrical/electronic modules, security systems, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery.

## Performance Skills

- Perform battery state-of-charge test.
- Confirm proper battery capacity, size, type, and application for vehicle; perform battery capacity and load test.
- Maintain or restore electronic memory functions as recommended by manufacturer.
- Inspect and clean battery; fill battery cells (if applicable); check battery cables, connectors, clamps, and hold-downs.
- Perform battery charging according to manufacturer's recommendations.

- Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply.
- Identify electrical/electronic modules, security systems, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery.

## STRAND 6

**Students will inspect the Starting System.**

### Standard 1

Perform starter current draw test; determine needed action.

### Standard 2

Perform starter circuit voltage drop tests; determine needed action.

### Standard 3

Inspect and test starter relays and solenoids; determine needed action.

### Standard 4

Remove and install starter in a vehicle.

### Standard 5

Inspect and test switches, connectors, and wires of starter control circuits; determine needed action.

### Standard 6

Demonstrate knowledge of automatic idle-stop/start-stop system.

### Standard 7

Differentiate between electrical and engine mechanical problems that cause a slow-crank or a no-crank condition.

### Standard 8

Diagnose a no-crank condition using a wiring diagram and test equipment; determine needed action.

## Performance Skills

- Perform starter current draw test.
- Perform starter circuit voltage drop tests.
- Inspect and test starter relays and solenoids
- Remove and install starter in a vehicle.
- Inspect and test switches, connectors, and wires of starter control circuits.
- Demonstrate knowledge of automatic idle-stop/start-stop system.
- Differentiate between electrical and engine mechanical problems that cause a slow-crank or a no-crank condition.
- Diagnose a no-crank condition using a wiring diagram and test equipment.

## STRAND 7

**Students will inspect the Charging System.**

### Standard 1

Perform charging system output test; determine needed action.

**Standard 2**

Inspect, adjust, and/or replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment; determine needed action.

**Standard 3**

Remove, inspect, and/or replace generator (alternator); determine needed action.

**Standard 4**

Perform charging circuit voltage drop tests; determine needed action.

**Standard 5**

Diagnose charging system for causes of undercharge, no-charge, or overcharge conditions; determine needed action.

**Performance Skills**

- Perform charging system output test.
- Inspect, adjust, and/or replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment.
- Remove, inspect, and/or replace generator (alternator).
- Perform charging circuit voltage drop tests.
- Diagnose charging system for causes of undercharge, no-charge, or overcharge conditions.

**STRAND 8**

**Students will inspect Lighting System(s).**

**Standard 1**

Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); determine needed action.

**Standard 2**

Aim headlights.

**Standard 3**

Diagnose the causes of brighter-than-normal, intermittent, dim, or no light operation; determine needed action.

**Performance Skills**

- Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights).
- Aim headlights.
- Diagnose the causes of brighter-than-normal, intermittent, dim, or no light operation.

**STRAND 9**

**Students will inspect Instrument Cluster and Driver Information System(s).**

**Standard 1**

Verify operation of instrument panel gauges and warning/indicator lights; reset maintenance indicators as required.

**Standard 2**

Inspect and test gauges and gauge sending units for causes of abnormal readings; determine needed action.

**Standard 3**

Diagnose the causes of incorrect operation of warning devices and other driver information systems; determine needed action.

**Performance Skills**

- Verify operation of instrument panel gauges and warning/indicator lights.
- Inspect and test gauges and gauge sending units for causes of abnormal readings.
- Diagnose the causes of incorrect operation of warning devices and other driver information systems.

**STRAND 10**

**Students will inspect Body Electrical System(s).**

**Standard 1**

Diagnose vehicle comfort, convenience, access, safety, and related systems operation; determine needed action.

**Standard 2**

Remove and reinstall door panel.

**Standard 3**

Diagnose operation of security/anti-theft systems and related circuits (such as: theft deterrent, door locks, remote keyless entry, remote start, and starter/fuel disable); determine needed action.

**Standard 4**

Describe disabling and enabling procedures for supplemental restraint system (SRS); verify indicator lamp operation.

**Standard 5**

Verify windshield wiper and washer operation; replace wiper blades.

**Standard 6**

Diagnose operation of entertainment and related circuits (such as: radio, DVD, remote CD changer, navigation, amplifiers, speakers, antennas, and voice-activated accessories); determine needed action.

**Standard 7**

Diagnose operation of safety systems and related circuits (such as: horn, airbags, seat belt pretensioners, occupancy classification, wipers, washers, speed control/collision avoidance, heads-up display, parking assist, and back-up camera); determine needed action.

**Standard 8**

Diagnose body electronic system circuits using a scan tool; check for module communication errors (data communication bus systems); determine needed action.

**Standard 9**

Describe the process for software transfer, software updates, or reprogramming of electronic modules.



## Performance Skills

- Diagnose vehicle comfort, convenience, access, safety, and related systems operation.
- Remove and reinstall door panel.
- Diagnose operation of security/anti-theft systems and related circuits (such as: theft deterrent, door locks, remote keyless entry, remote start, and starter/fuel disable).
- Describe disabling and enabling procedures for supplemental restraint system (SRS); verify indicator lamp operation.
- Verify windshield wiper and washer operation; replace wiper blades.
- Diagnose operation of entertainment and related circuits (such as: radio, DVD, remote CD changer, navigation, amplifiers, speakers, antennas, and voice-activated accessories).
- Diagnose operation of safety systems and related circuits (such as: horn, airbags, seat belt pretensioners, occupancy classification, wipers, washers, speed control/collision avoidance, heads-up display, parking assist, and back-up camera).
- Diagnose body electronic system circuits using a scan tool; check for module communication errors (data communication bus systems).
- Describe the process for software transfer, software updates, or reprogramming of electronic modules.