

Automotive Engine Repair and Performance

Career Cluster	Transportation, Distribution & Logistics
Course Code	20121
Prerequisite(s)	Introduction to Vehicle Systems and Maintenance or Maintenance and Light Repair - Recommended
Credit	1.0
Program of Study and Sequence	Foundational courses – Introduction to Vehicle Systems and Maintenance or Maintenance and Light Repair – Automotive Engine Repair and Performance – Capstone Experience
Student Organization	SkillsUSA
Coordinating Work-Based Learning	N/A
Industry Certifications	ASE
Dual Credit or Dual Enrollment	See: https://sdmylife.com/images/Approved-CTE-Dual-Credit.pdf
Teacher Certification	Transportation, Distribution & Logistics Cluster Endorsement
Resources	N/A

Course Description

Completion of Automotive Engine Repair and Performance will help students prepare for post-secondary education and training. This course will further students' technical education experience and help prepare them for the workforce. Course standards are based on the Maintenance and Light Repair (MLR) standards for ASE MLR.

Students will learn:

- How to work safely on the vehicle in a workshop situation.
- Engine operation based on the six operating systems: lubrication, cooling, fuel, ignition, air induction and exhaust systems.
- General engine maintenance to include valve train, lubrication and cooling system.
- General engine performance to include computerized controls, fuel, air induction, exhaust systems and emissions control systems.

Program of Study Application

Automotive Engine Repair and Performance is an advanced pathway course in the Transportation, Distribution and Logistics career cluster, automotive technology pathway.

Course Standards

EPER 1: Students will demonstrate automotive technology safety practices, as identified in Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) requirements for an automotive repair facility.	
<i>Webb Level</i>	<i>Sub-indicator</i>
One Recall & Reproduction	<p>EPER 1.1 Demonstrate automotive technology safety practices.</p> <ul style="list-style-type: none"> ● Identify general shop safety rules and procedures ● Identify and use proper procedures for safe jack and lift operations ● Utilize proper ventilation procedures for working within the lab/shop area ● Identify the location and the types of fire extinguishers and other fire safety equipment ● Identify the location and use of eye wash stations ● Identify the location of posted evacuation routes ● Locate and demonstrate knowledge of Safety Data Sheets (SDS)

EPER 2: Students will demonstrate proper tool selection and usage.	
<i>Webb Level</i>	<i>Sub-indicator</i>
One Recall & Reproduction	<p>EPER 2.1. Demonstrate proper tool selection and usage:</p> <ul style="list-style-type: none"> ● Identify tools and their usage in automotive applications ● Identify standard and metric designation ● Demonstrate safe handling and use of appropriate tools ● Demonstrate proper cleaning, storage, and maintenance of tools and equipment ● Demonstrate proper use of precision measuring tools (e.g. micrometer, dial-indicator, dial-caliper)

EPER 3: Students will prepare the vehicle for service.	
<i>Webb Level</i>	<i>Sub-indicator</i>
Two Skill/Concept	<p>EPER 3.1 Perform preparatory procedures for vehicle service.</p> <ul style="list-style-type: none"> ● Identify information needed and the service requested on a repair order ● Identify purpose and demonstrate proper use of fender covers, mats ● Demonstrate use of the three C's: concern, cause, and correction ● Review vehicle service history ● Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction

EPER 4: Students will perform engine repair.	
<i>Webb Level</i>	<i>Sub-indicator</i>
Two Skill/Concept	<p>EPER 4.1 Perform engine maintenance operations.</p> <ul style="list-style-type: none"> ● 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

	<ul style="list-style-type: none"> • 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: removing broken bolt, restoring internal and external threads, and repairing internal threads with thread insert • Identify service precautions related to service of the internal combustion engine of a hybrid vehicle
Two Skill/Concept	<p>EPER 4.2 Understand component operation and perform maintenance on cylinder head and valve train.</p> <ul style="list-style-type: none"> • Adjust valves (mechanical or hydraulic lifters) • Identify components of the cylinder head and valve train
Two Skill/Concept	<p>EPER 4.3 Test, inspect and perform maintenance on the lubrication and cooling system.</p> <ul style="list-style-type: none"> • Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, heater core, and galley plugs; determine necessary action • Inspect, replace, and/or adjust drive belts, tensioners, and pulleys; check pulley and belt alignment • Remove, inspect, and replace thermostat and gasket/seal • Inspect and test coolant; drain and recover coolant; flush and refill cooling system; use proper fluid type per manufacturer specification; bleed air as required • Perform engine oil and filter change; use proper fluid type per manufacturer specification; reset maintenance reminder as required • Identify components of the lubrication and cooling systems

EPER 5: Students will test, diagnose, and repair engine performance issues.	
<i>Webb Level</i>	<i>Sub-indicator</i>
Three Strategic Thinking	<p>EPER 5.1. Perform engine diagnostics and analyze retrieved data.</p> <ul style="list-style-type: none"> • Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins • Perform engine absolute manifold pressure tests (vacuum/boost); document results • Perform cylinder power balance test; document results • Perform cylinder cranking and running compression tests; document results • Perform cylinder leakage test; document results • Verify engine operating temperature • Remove and replace spark plugs; inspect secondary ignition components for wear and damage
Three Strategic Thinking	<p>EPER 5.2. Test the computerized controls and analyze retrieved data.</p> <ul style="list-style-type: none"> • Retrieve and record diagnostic trouble codes (DTC), On-board Diagnostic (OBD) monitor status, and freeze frame data; clear codes when applicable • Describe the use of the OBD monitors for repair verification
Two	<p>EPER 5.3. Perform maintenance on the fuel, air Induction, and exhaust systems</p>

Skill/Concept	<ul style="list-style-type: none"> • Replace fuel filter(s) where applicable • Inspect, service, or replace air filters, filter housings, and intake duct work • 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; determine necessary action • Check and refill diesel exhaust fluid (DEF)
Two Skill/Concept	<p>EPER 5.4. Perform maintenance operations on emissions control system.</p> <ul style="list-style-type: none"> • Inspect, test, and service Positive Crankcase Ventilation (PCV) filter/breather, valve, tubes, orifices, and hoses; perform necessary action

EPER 6: Students will understand and apply appropriate business practices.	
<i>Webb Level</i>	<i>Sub-indicator</i>
Three Strategic Thinking	EPER 6.1 Demonstrate the importance of, and the procedures for, maintaining accurate records.
Three Strategic Thinking	EPER 6.2 Understand the concept and application of ethical business practices.
Three Strategic Thinking	EPER 6.3 Understand the concept and application of excellent customer relations practices.