



Introduction to Vehicle Systems & Maintenance

Career Cluster	Transportation, Distribution & Logistics
Course Code	20106
Prerequisite(s)	None
Credit	0.5 or 1.0
Program of Study and Sequence	Any Foundation course – Introduction to Vehicle Systems & Maintenance – pathway course in the automotive technology; automotive body, collision & refinishing; or diesel pathway
Student Organization	SkillsUSA
Coordinating Work-Based Learning	N/A
Industry Certifications	N/A
Dual Credit or Dual Enrollment	See: https://sdmylife.com/images/Approved-CTE-Dual-Credit.pdf
Teacher Certification	Transportation, Distribution & Logistics Cluster Endorsement; Automotive Technology Pathway Endorsement; *Automotive Technology *7-12 Technology Education
Resources	N/A

Course Description

Intro to Vehicle Systems & Maintenance is an introductory automobile course. Students will study the basic principles of electrical and mechanical systems used in motor vehicle technology while developing core hand skills. This course is designed to give learners information on basic ownership and maintenance of a vehicle, insights into careers in the automotive service and repair industry, and encourage learners to undertake practical maintenance and repair tasks.

Program of Study Application

Intro to Vehicle Systems and Maintenance is a cluster course in the Transportation, Distribution and Logistics career cluster. Intro to Vehicle Systems and Maintenance will prepare a student to enter any of the pathways in the cluster.

Course Standards

IVSM 1: Students will demonstrate automotive technology safety practices, including 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>
Two Skill/Concept	IVSM 1.1 Demonstrate automotive technician safety practices. <ul style="list-style-type: none"> ● Use protective clothing and safety equipment according to OSHA and EPA requirements ● Summarize the proper use of safety data sheet (SDS) ● Demonstrate the proper use of hand and power tools ● Examine basic shop safety using OSHA standards ● Maintain a portfolio of successfully completed safety and equipment exams
Two Skill/Concept	IVSM 1.2 Understand the way in which waste gasses, emissions, and other environmentally destructive substances are generated and their effects on the environment. <ul style="list-style-type: none"> ● Understand the formation of carbon monoxide in internal combustion engines and the effects on the environment ● Study the effects of vehicle emissions on the ecosystem ● Compare the emissions of hydro-fuel cell, electric, and gasoline powered vehicles

IVSM 2: Students explore career opportunities in the Transportation, Distribution and Logistics career cluster and develop leadership skills.	
<i>Webb Level</i>	<i>Sub-indicator</i>
Two Skill/Concept	IVSM 2.1 Demonstrate independent and teamwork skills. <ul style="list-style-type: none"> ● Develop a teamwork project (change oil, tire rotation)
Two Skill/Concept	IVSM 2.2 Explore career opportunities within the industry. <ul style="list-style-type: none"> ● Utilize guidance software to research and report on career opportunities ● Update student portfolios and personal learning plans

IVSM 3: Students will demonstrate an understanding of the safe and appropriate use of tools, equipment and work processes.	
<i>Webb Level</i>	<i>Sub-indicator</i>
Two Skill/Concept	IVSM 3.1. Understand and use the appropriate tools and equipment. <ul style="list-style-type: none"> ● Demonstrate proper usage of tools and equipment ● Inspect and perform preventative and required maintenance of tools and equipment
Two Skill/Concept	IVSM 3.2. Diagnose and analyze components and systems. <ul style="list-style-type: none"> ● Use DMM (digital multi-meter) to measure electrical voltage, amps and resistance ● Demonstrate use of a load tester on a battery, charging, and starting systems

Two Skill/Concept	IVSM 3.3. Select and demonstrate proper use of measuring devices and mathematical formulas. <ul style="list-style-type: none"> Identify the measuring instruments needed to assure proper tolerance ranges can be achieved (micrometer, caliper) Identify, apply, and calculate mathematical formulas that apply to the automotive industry (Ohm’s Law, cubic displacement, horse power)
Two Skill/Concept	IVSM 3.4. Use and understand standard and metric units of measurements. <ul style="list-style-type: none"> Measure brake rotor with caliper and compare to specifications Measure tread width and mathematically calculate the sidewall height of the tire using the aspect ratio of the tire Convert standard units and metric units
Two Skill/Concept	IVSM 3.5. Use measurement devices to diagnose and repair vehicles and components following industry standards. <ul style="list-style-type: none"> Identify tools and equipment used to measure caster, camber and toe Measure resistance in spark plug high-tension leads to assure proper operation of ignition system
Two Skill/Concept	IVSM 3.6. Demonstrate access and proper usage of Technical Service Bulletins (TSB) and service manuals. <ul style="list-style-type: none"> Utilize service information to find vehicle specifications Use vehicle owner’s manual to find proper quantity and quality of oil to use to perform an engine oil and filter change Use scan tool to pull trouble codes from vehicle’s computer diagnostic system
Three Strategic Thinking	IVSM. 3.7. Comprehend the importance of calibration processes, systems, and techniques using various measuring and testing devices. <ul style="list-style-type: none"> Calibrate a dial indicator Check the accuracy of an outside/inside micrometer Calibrate an Ohm meter

IVSM 4: Students understand scientific principles in relation to chemical, mechanical, and physical functions of various power plants and vehicle systems.	
<i>Webb Level</i>	<i>Sub-indicator</i>
Two Skill/Concept	IVSM 4.1. Demonstrate knowledge of the operation of the internal combustion engine. <ul style="list-style-type: none"> Identify different types of gasoline and diesel engines and 2 and 4 stroke engines Compare the similarities and differences in a 2 and 4 stroke cycle
Two Skill/Concept	IVSM 4.2. Demonstrate a basic understanding of the operating principles of heating and air conditioning systems. <ul style="list-style-type: none"> Identify the components of heating and air conditioning systems Describe the air flow and refrigerant flow in heating and air conditioning systems
Two Skill/Concept	IVSM 4.3. Compare alternate fuel and power sources.

	<ul style="list-style-type: none"> ● Identify and research hybrid, fuel cell, and electric vehicles and explain how these vehicles work for a written report or presentation ● Understand fundamental hazards of dealing with hybrid, fuel cell, and electric vehicles
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IVSM 5: Students perform and document maintenance procedures according to manufacturers' specifications.	
<i>Webb Level</i>	<i>Sub-indicator</i>
Three Strategic Thinking	IVSM 5.1. Demonstrate the procedures and practices for manufacturers' repair and maintenance schedules. <ul style="list-style-type: none"> ● Change oil and filter according to manufacturer's specs ● Check proper inflation and condition of vehicle tires ● Check and refill critical fluids ● Inspect belts and hoses
Three Strategic Thinking	IVSM 5.2. Demonstrate the use of service information to repair a vehicle. <ul style="list-style-type: none"> ● Utilize service information to find vehicle specifications ● Use vehicle owner manual to find proper quantity and quality of oil to use to perform an engine oil and filter change
Three Strategic Thinking	IVSM 5.3 Demonstrate tire maintenance/tire care (tire rotation, tread depth, air pressure, and tire wear types).

IVSM 6: Students explore considerations when purchasing, owning, maintaining, and selling a vehicle.	
<i>Webb Level</i>	<i>Sub-indicator</i>
Two Skill/Concept	IVSM 6.1 Understand and demonstrate skills for purchasing, owning, maintaining and selling a vehicle. <ul style="list-style-type: none"> ● Demonstrate knowledge of purchasing a vehicle, including how to select a vehicle ● Explore various vehicle types ● Compare and contrast buying from a dealer versus purchasing from a private party, and buying versus leasing a vehicle ● Understand the costs associated with owning a vehicle including licensing, registration, insurance, loans, interest rates, credit scores, depreciation and other factors

IVSM 7: Students will understand and apply appropriate vehicle service and repairs.	
<i>Webb Level</i>	<i>Sub-indicator</i>
Two Skill/Concept	IVSM 7.1 Perform general automotive diagnosis and repair in professional manner within National Automotive Technicians Education Foundation (NATEF) standards. <ul style="list-style-type: none"> ● Perform engine compression test (dry/wet) ● Set gap and replace spark plugs and wires as needed

Two Skill/Concept	IVSM 7.2 Perform basic roadside maintenance and repairs, including simple diagnostics. <ul style="list-style-type: none"> ● Replace a tire and rim, change wiper blades, and demonstrate other basic maintenance tasks. ● Diagnose what to do if check engine light comes on ● Check gauges for sufficient oil pressure, fuel, and other indications
One Recall and Recognition	IVSM 7.3 Understand what items should be in a vehicle in case of problems. <ul style="list-style-type: none"> ● Flashlights, blankets, basic food, jumper cables, tow strap, small/folding shovel, first aid kit, candle, safety triangle/flares, can of green slime, and other basic necessities.
Two Skill/Concept	IVSM 7.4 Demonstrate ability to maintain and service lubrication and cooling systems. <ul style="list-style-type: none"> ● Analyze engine oil pressure ● Remove and install an oil pressure sending unit ● Inspect and test cooling system and pressure cap
Two Skill/Concept	IVSM 7.5 Understand the basic operation of computer-controlled systems, and location and identification of related parts. <ul style="list-style-type: none"> ● Use a code reader and or scanner to diagnose computer system failure ● Locate and test computer components ● Clear trouble codes from computer with scanner

IVSM 8: Students understand the function, principles and operation of electrical systems using manufacturers' and industry standards.	
<i>Webb Level</i>	<i>Sub-indicator</i>
Two Skill/Concept	IVSM 8.1 Demonstrate an understanding of how to diagnose and repair electrical systems. <ul style="list-style-type: none"> ● Clean battery terminals and electrical connections ● Use DVOM (digital volt ohm meter) to check voltage drop at connections ● Use DVOM to check resistance in electrical circuits
Two Skill/Concept	IVSM8.2 Diagnose and service batteries. <ul style="list-style-type: none"> ● Check battery state-of-charge with hydrometer or DVOM ● Check battery load capacity with load tester ● Remove and replace battery
Two Skill/Concept	IVSM 8.3 Demonstrate knowledge needed to diagnose and repair starting and charging systems. <ul style="list-style-type: none"> ● Check starting system draw with starting system tester ● Check charging system output with charging system tester
Two Skill/Concept	IVSM 8.4 Demonstrate ability to properly diagnose and repair lighting systems. <ul style="list-style-type: none"> ● Adjust headlights ● Remove and replace headlight/taillight bulbs ● Replace bulbs ● Test electrical system circuits and components
Two Skill/Concept	IVSM 8.5 Demonstrate ability to properly diagnose and repair heating and air conditioning systems. <ul style="list-style-type: none"> ● Test strength and condition of coolant

	<ul style="list-style-type: none"> ● Remove and replace coolant and flush if needed ● Test output temperature of A/C system
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IVSM 9: Students understand the function and principles of automotive brake, steering and suspension, automatic and manual transmission systems.	
<i>Webb Level</i>	<i>Sub-indicator</i>
Two Skill/Concept	IVSM 9.1 Demonstrate how to diagnose and service hydraulic and friction systems. <ul style="list-style-type: none"> ● Check brake pad dimensions and conditions ● Check condition of rotor and/or drum ● Check for leaks, cracks or bulges in brake lines ● Check emergency brake cable operation
Two Skill/Concept	IVSM 9.2 Demonstrate how to diagnose and service steering and suspension systems. <ul style="list-style-type: none"> ● Check for proper power steering fluid condition and level ● Check condition of front and rear struts and/or shocks
Two Skill/Concept	IVSM 9.3 Demonstrate how to diagnose and service automatic and manual transmissions. <ul style="list-style-type: none"> ● Check automatic and manual transmission fluid levels ● Replace automatic transmission fluid and filter