ATV/Small Engine Mechanics

Course Number - 20109

Rational Statement:

- There is a high demand for trained individuals in the small engine ATV service field. The desire for the students to receive industry based training at the basic level and step up to the higher level of competency in this field is the ultimate goal of this course. Completions of this course will aide students as they continue their education at the post-secondary level or in the workforce.

Suggested Grade Level:

Topics Covered:

- Safety
- Administrative functions
- Communication, mathematics, & science
- Diagnostic procedures
- Electrical systems
- Ignition systems
- Fuel delivery systems
- Emission systems

Core Technical Standards & Examples

Indicator #1: Safe shop practices, teamwork, and customer relations	
Bloom's Taxonomy Level	**Standards and Examples**
Understand	**SEM1.1 Demonstrate shop safety** Examples: • Summarize the proper use of MSDS (material safety Data sheets) • Demonstrate the proper use of hand and power tools • Examine basic shop safety using OSHA (Occupational Safety Health Administration) standards • Maintain a portfolio record of written safety examinations and equipment examinations for which the student has passed an operational checkout by the instructor
Understand	**SEM1.2 Demonstrate independent and teamwork skills and explore career opportunities within the industry** Examples: • Participate in CTSO's (i.e. SkillsUSA, Ford AAA Student Auto Skills, etc) • Develop a teamwork project • Utilize guidance software to research and report on career

	opportunities • Update student's portfolio
Indicator # 2: Properly perform administrative functions	
Bloom's Taxonomy Level	**Standards and Examples**
Apply	**SEM2.1 Complete Customer work order form** Examples: • Utilize appropriate parts identification media • Utilize appropriate service identification media • Communicate with customer and/or supervisor to determine service requested • Maintain work order records to account for parts and labor
Apply	**SEM2.2 Prepare customer bill/receipt** Examples: • Write a service order • Identify work performed on work orders • Calculate labor cost using a flat rate manual
Indicator #3: Apply communication, mathematics and science knowledge and skills to small engine performance technology	
Bloom's Taxonomy Level	**Standard and Examples**
Understand	**SEM3.1 Examine how physics concepts apply to small engine technology** Example: • Student will determine horsepower of any small engine using the HP=W/(T*33,000). HP = Horsepower, W = Work, T = Time
Understand	**SEM3.2 Explore the application of fundamental laws of hydraulics** Examples: • Student will demonstrate the principles of fluids being noncompressible by building a basic hydraulic cylinder/motor device on a test bench.
Apply	**SEM3.3 Perform mathematical calculations and measurements commonly used in small engines** Examples: • Student will calculate displacement of any given engine based on the equation $d=c*b^2s$ c-constant 0.7584, b-bore, s-stroke, d-displacement • The amount of work can be found with the equation w=f*d w-work in lb/ft (ftlb), f-force in pounds, d-distance in feet

Understand	**SEM3.4 Communicate findings as related to mathematics and science knowledge and skills to diagnosis problems in small engines** Examples: • Students will complete a written report given the findings of any lab activity. (i.e. low horse power due to poor air exchange)
Indicator #4: Evaluate strategic diagnostic procedures for small engines	
Bloom's Taxonomy Level	**Standards and Examples**
Apply	**SEM4.1 Implement strategic diagnostic procedures** Examples: • Apply small engine theory • Diagnose and determine needed repair on small engine components • Determine wear on internal engine parts using specialized tools
Apply	**SEM4.2 Conduct preventative maintenance on small engine** Examples: • Change oil and filter on small engine • Inspect and change air filter • Disassemble, clean, and inspect fuel pump • Disassemble, clean, and inspect carburetor
Indicator # 5: Properly test, diagnose, service, and repair charging and electrical systems related to small engines	
Bloom's Taxonomy Level	**Standards and Examples**
Understand	**SEM5.1 Illustrate the application of Ohm's law to charging and electrical systems related to small engines** Examples: • Complete the start amp draw test on a small engine with an electric start system. • Compute amperage use of any circuit by using the equation amps=volts/ohms
Analyze	**SEM5.2 Interpret schematics, diagrams, and reference information used in small engine electrical systems** Examples: • Troubleshoot the charging circuit using a manufacturer's guide • Apply electrical theory • Read a multimeter
Evaluate	**SEM5.3 Use strategy based diagnostics for determining the cause of a fault in an electrical circuit** Examples: • Test, diagnose, and service batteries and charging systems • Test, diagnose, and service light systems

	• Demonstrate the use of equipment and tools for electrical testing and diagnosis • Troubleshoot and repair starting circuit
Indicator #6: Properly test, diagnose, service and repair ignition systems related to small engines	
Blooms Taxonomy Level	**Standards and Examples**
Analyze	**SEM6.1 Analyze the function and operation of an ignition system related to small engine technology** Examples: • Complete a diagnostic test of both electronic ignition and breaker point ignition systems • Complete a coil discharge test. • Complete adjustment or replacement of standard breaker points, condenser, and/or trigger module.
Apply	**SEM6.2 Diagnose ignition system problems** Examples: • Test and replace ignitions wires • Time the ignition system • Test and replace coil/magneto • Test and replace safety switch
Evaluate	**SEM6.3 Perform ignition system service** Examples: • Remove, inspect, adjust and install the sparkplugs • Remove, inspect, and replace the flywheel • Remove, inspect, and replace points and condenser system
Indicator # 7: Properly test, diagnose, service and repair fuel delivery system as related to small engine Technology	
Blooms Taxonomy Level	**Standards and Examples**
Analyze	**SEM7.1 Analyze the functions and operations of a fuel systems related to small engine technology** Examples: • Complete fuel pressure test of system utilizing a fuel pump. • Set carburetor float height. • Adjust both low and high idle circuits on carburetor engines • Complete fuel injector function test on fuel injected engines.

Evaluate	**SEM7.2 Diagnose fuel system problem** Examples: • Test and determine needed repair on fuel system • Inspect and determine needed repair on air cleaner system
Apply	**SEM7.3 Perform fuel system service** Examples: • Remove and replace the fuel tank, fuel lines and fuel filter system • Service oil-bath or foam type air cleaner • Reassemble and adjust a carburetor • Reassemble and install fuel pump
Indicator # 8: Properly test, diagnose, service and repair emission systems related to small engine technology	
Blooms Taxonomy Level	**Standards and Examples**
Analyze	**SEM8.1 Analyze the function and operation of emission systems related to small engines** Examples: • After researching EPA emissions standards and requirements, write a report on how those laws affect the small engine service industry.
Evaluate	**SEM8.2 Diagnose emission systems relating to small engine technology** Examples: • Use an exhaust gas analyzer to determine the amount of HC and NO_x emissions contained in the exhaust from a small engine and determine repair strategies. • Complete electrical/electronic testing of MAP sensor, O_2 or throttle position sensor and determine whether repair or replacement of parts is needed.
Apply	**SEM8.3 Perform emission system service on small engine** Examples: • Replace a MAP sensor. • Replace a fuel pressure sensor. • Demonstrate or observe a fuel map in electronic format.