



ATV/SEM (All-Terrain Vehicle/Small Engine Mechanics)

Career Cluster	Transportation, Distribution & Logistics
Course Code	20110
Prerequisite(s)	None
Credit	.5
Program of Study and Sequence	Any Foundation course – ATV/SEM – Any pathway course - Capstone
Student Organization	SkillsUSA
Coordinating Work-Based Learning	Job Shadow
Industry Certifications	NA
Dual Credit or Dual Enrollment	NA
Teacher Certification	Transportation, Distribution & Logistics Cluster Endorsement; Automotive Technology Pathway Endorsement *Automotive Technology ; *7-12 Technology Education
Resources	

Course Description:

ATV/SEM is an introductory course on the small gas engine. The student will study the various small engine types, parts identification, and engine operation. Students will tear down a small gas engine. In order to have a properly running engine, students will inspect, reassemble and trouble shoot. Student evaluation is performance based.

Program of Study Application

ATV/SEM is a cluster course within the Transportation, Distribution and Logistics career cluster.

Course Standards

SEM 1 Students will demonstrate shop and tool safety.

<i>Webb Level</i>	<i>Sub-indicator</i>	<i>Integrated Content</i>
Level 1 Recall & Reproduction	SEM 1.1 Examine basic shop safety using Occupational Safety Health Administration (OSHA) standards Examples: <ul style="list-style-type: none"> • Locate Fire extinguisher/ Fire Blankets/Exits • Never have an open flame near flammable liquids • Do not refuel engine while in operation • Demonstrate proper start up and shutoff procedures (be aware of surroundings when pull-starting small gas engine (SGE)) • Eye and hearing protection • Clothing and shoe protection 	OSHA 10 Briggs & Stratton http://www.instructorcorner.org
Level2 Skill\Concept	SEM 1.2 Demonstrate proper use of hand and power tools Examples: <ul style="list-style-type: none"> • General tool test (Name and function of tool being used, proper use of each tool, care and storage) • Review Torque wrench settings and usage • Spark test tools (Use appropriate spark tester to check spark) 	Briggs & Stratton
Level2 Skill\Concept	SEM 1.3 Summarize the proper use of Safety Data Sheets (SDS) Examples: <ul style="list-style-type: none"> • Handling and storage of related liquids to SGE (Small Gas Engine) • Firefighting measures • Hazards identification 	SDS SHEET OSHA
Level 3 Strategic Thinking	SEM 1.4 Create safety portfolio Examples: <ul style="list-style-type: none"> • Maintain records of written safety examinations • Maintain records of equipment examinations for which the student has passed an operational checkout • OSHA 10 certification • Review SDS 	

Notes

SEM 2 Students will demonstrate independent and teamwork skills as well as explore career opportunities within the industry.

<i>Webb Level</i>	<i>Sub-indicator</i>	<i>Integrated Content</i>
Level 3 Strategic Thinking	SEM 2.1 Participate in leadership activities Example: <ul style="list-style-type: none"> CTSO's (Career and Technical Student Organizations) 	SkillsUSA
Level 4 Extended Thinking	SEM 2.2 Utilize guidance software to research and report on career opportunities	SDMyLife
Level 3 Strategic Thinking	SEM 2.3 Develop a teamwork project Example: <ul style="list-style-type: none"> Tear down/Rebuild procedures 	

Notes

SEM 3 Students will properly prepare customer documentation.

<i>Webb Level</i>	<i>Sub-indicator</i>	<i>Integrated Content</i>
Level 3 Strategic Thinking	SEM 2.1 Complete work order form Examples: <ul style="list-style-type: none"> • Utilize appropriate parts identification media • Communicate with customer and/or supervisor to determine service requested • Maintain work order records to account for parts and labor 	http://parts.sepw.com/?gclid=CKT_qt75q9QCFUVWDQodYpEIaw
Level 3 Strategic Thinking	SEM 2.2 Prepare customer bill/receipt Examples: <ul style="list-style-type: none"> • Write a service order • Identify work performed on work orders • Calculate labor cost using a flat rate manual 	http://parts.sepw.com/?gclid=CKT_qt75q9QCFUVWDQodYpEIaw

Notes

SEM 4 Students will apply communication, mathematics and science knowledge and skills to ATV/SEM.

<i>Webb Level</i>	<i>Sub-indicator</i>	<i>Integrated Content</i>
Level 3 Strategic Thinking	SEM 4.1 Examine how physics concepts apply to small engine technology Example: <ul style="list-style-type: none"> Student will determine horsepower of any small engine using $HP=W/(T*33,000)$. HP = Horse power, W = Work, T = Time 	Briggs & Stratton
Level 3 Strategic Thinking	SEM 4.2 Explore the application of fundamental laws of hydraulics Examples: <ul style="list-style-type: none"> Student will demonstrate the principle that fluids cannot be compressed by building a basic hydraulic cylinder/motor device on a test bench. 	
Level 3 Strategic Thinking	SEM 4.3 Perform mathematical calculations and measurements commonly used in small engines Examples: <ul style="list-style-type: none"> 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 $w=f*d$ where w=work in lb/ft (ftlb), f=force in pounds, d=distance 	
Level 3 Strategic Thinking	SEM 4.4 Communicate findings as related to mathematics and science knowledge and skills to diagnosis problems in small engines Examples: <ul style="list-style-type: none"> Students will complete a written report given the findings of any lab activity (e.g. low horse power due to poor air exchange). 	

Notes

SEM 5 Students will troubleshoot a small engine.

<i>Webb Level</i>	<i>Sub-indicator</i>	<i>Integrated Content</i>
Level 4 Extended Thinking	SEM 5.1 Implement strategic diagnostic procedures Examples: <ul style="list-style-type: none"> • Apply small engine trouble shooting procedures • Diagnose and determine needed repair on small engine components • Determine wear on internal engine parts using specialized tools 	Briggs & Stratton
Level 2 Skill\Concept	SEM 5.2 Conduct preventative maintenance on a small engine Examples: <ul style="list-style-type: none"> • Change oil and filter on small engine • Inspect and change air filter • Disassemble, clean, and inspect fuel pump • Disassemble, clean, and inspect carburetor 	

Notes

SEM 6 Students will properly test, diagnose, service, and repair charging and electrical systems related to small engines.

<i>Webb Level</i>	<i>Sub-indicator</i>	<i>Integrated Content</i>
Level 3 Strategic Thinking	SEM 6.1 Illustrate the application of Ohm's law to charging and electrical systems related to small engines Examples: <ul style="list-style-type: none"> • 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 $\text{amps} = \text{volts} / \text{ohms}$ 	Briggs & Stratton
Level 2 Skill\Concept	SEM 6.2 Interpret schematics, diagrams, and reference information used in small engine electrical systems Examples: <ul style="list-style-type: none"> • Troubleshoot the charging circuit using a manufacturer's guide • Read a multimeter 	
Level 3 Strategic Thinking	SEM 6.3 Use strategy-based diagnostics for determining the cause of a fault in an electrical circuit Examples: <ul style="list-style-type: none"> • 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 	

Notes

SEM 7 Students will properly test, diagnose, service and repair fuel delivery systems as related to small engine technology.

<i>Webb Level</i>	<i>Sub-indicator</i>	<i>Integrated Content</i>
Level 3 Strategic Thinking	SEM 7.1 Analyze the functions and operations of a fuel system related to small engine technology Examples: <ul style="list-style-type: none"> • 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. 	Briggs & Stratton
Level 3 Strategic Thinking	SEM 7.2 Diagnose fuel system problem Examples: <ul style="list-style-type: none"> • Test and determine needed repair on fuel system • Inspect and determine needed repair on air cleaner system 	
Level 3 Strategic Thinking	SEM 7.3 Perform fuel system service Examples: <ul style="list-style-type: none"> • 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 	

Notes

SEM 8 Students will properly test, diagnose, service and repair emission systems related to small engine technology.

<i>Webb Level</i>	<i>Sub-indicator</i>	<i>Integrated Content</i>
Level 4 Extended Thinking	SEM 8.1 Analyze the function and operation of emission systems related to small engines Examples: <ul style="list-style-type: none"> • Research EPA emissions standards and requirements, and write a report on how those laws affect the small engine service industry. 	Briggs & Stratton
Level 4 Extended Thinking	SEM 8.2 Diagnose emission systems relating to small engine technology Examples: <ul style="list-style-type: none"> • Use an exhaust gas analyzer to determine the amount of HC and NOx emissions contained in the exhaust from a small engine and determine repair strategies. • Complete electrical/electronic testing of manifold absolute pressure (MAP) sensor, O₂ (Oxygen) or throttle position sensor and determine whether repair or replacement of parts is needed. 	
Level 3 Strategic Thinking	SEM 8.3 Perform emission system service on small engine Examples: <ul style="list-style-type: none"> • Replace a MAP sensor. • Replace a fuel pressure sensor. • Demonstrate or observe a fuel map in electronic format 	

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