

# Advanced Small Gas Engines

Santa Maria Joint Union High School District

New Course  
Approved

Feb 28, 2020  
Scott Authier

## Basic Course Information

### School(s) Offering This Course:

School Name	Course Learning Environment	Transcript Code(s)	
Pioneer Valley High School (053847)	Classroom Based	<b>Abbreviation</b>	<b>Course Code</b>
		Adv Sm Gas EngA	IT6732
		Adv Sm Gas EngB	IT6733

<b>Title:</b>	Advanced Small Gas Engines
<b>Length of course:</b>	Full Year
<b>Subject area:</b>	College-Preparatory Elective (G) / Interdisciplinary
<b>UC honors designation?</b>	No
<b>Prerequisites:</b>	Small Gas Engines (Required)
<b>Co-requisites:</b>	None
<b>Integrated (Academics / CTE)?</b>	Yes
<b>Grade levels:</b>	10th, 11th, 12th

# course Description

## course overview:

This is a technical class with lab work for students who are interested in exploring a possible path to technician work in the outdoor power equipment field. Students who are generally interested in engines of all types should also take this class. The course covers the theory and repair procedures related to power equipment engines. During this course all students will work on live running air cooled engines of the lawn mower or go-cart type and the type used for powering generators and pumps. Students will work on engines in groups of two. All students should keep a daily note book with assigned reading and lecture notes. Students will be graded on attendance, test scores, lab work, skills mastery and the completion of required projects.

## course content:

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### 1. CAREER AND VOCATIONAL UNIT

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Education, Public School Instructor, Private or Vocational School Instructor, as well as Private Industry Instructor or Presenter will be covered. Other occupational Titles related to this area will be covered such as Service writer, Facility manager, Mechanic, Technician, and Engineer. Education and training opportunities are found in Academic/Vocational Institutions, High School, Community College, Private or Vocational Schools, and at the University level.

#### Unit Assignment(s):

Students will create a presentation about a specific career opportunity related to the small gas engine industry.

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### 2. Power Equipment Shop Practices

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Students will review the shop/classroom safety procedures associated with small gas engine tools and mechanics and maintenance of the shop. They will also study procedures and safety practices for lifting, working independently and collaboratively. Students will learn basic first aid steps to use in the event of an accident or injury. They will be introduced to Material Safety Data Sheets (MSDS) and glean pertinent safety information from them. Students will then take a safety exam as a demonstration of knowledge.

#### Unit Assignment(s):

Students will demonstrate through a written quiz their knowledge of shop rules and procedures, tools and equipment safety, and personal safety procedures. Students will also recognize any and all safety concerns within, around the shop and around the school campus. They will discuss how to correct and how to protect themselves when working within the shop. Students shall work in groups and make a PowerPoint presentation to the class exhibiting their findings.

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### 3. Measurements, Tools, and Equipment

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Students will recognize basic hand tools and will identify the correct tool for the job. They will also demonstrate proper use of the tools. Students will differentiate between various service manuals. They will explore the precision measuring tools including rulers, gauges, and micrometers and learn how to use them to obtain precise measurements. Students will identify a variety of fasteners and their uses.

#### Unit Assignment(s):

Students will demonstrate their knowledge of tools and equipment by using industry-accepted terminology when referring to specific tools and equipment. They will select and justify the appropriate tools for a teacher given project. Students will demonstrate in the lab/shop their knowledge of tool and equipment use, maintenance, and storage by successfully completing the NATEF (National Automotive Technicians Education Foundation) related tasks.

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### 4. 4-Stroke (OHV-head) Engine Disassembly

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Student will receive Lab/Shop orientation instruction as well as work station and storage, tool checkout and storage, cleanup and safety, and shop etiquette. Engine orientation and procedures as well as operating systems, and engine handling safety practices will be covered. Engine model identification, engine repair manual for disassembly/assembly procedures as well as service and specifications will be covered.

#### Unit Assignment(s):

Students will disassemble an 8 HP “OHV-head” engine and identify the systems as well as the engine parts.

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### 5. Small Gas Engine Electrical System

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Students will review electrical theory and practices related to the small gas engine. Electron movement, Ions, Ohms, Volts and Amps will be covered, Electrical circuit design, power supply without a battery (the magneto system) will be covered. Mathematical calculations using Ohm’s Law will be covered. (Calculating amperage ( $I = E/R$ ); voltage ( $E = I \times R$ ); Calculating resistance ( $R = E/I$ ))

## Unit Assignment(s):

Students will construct a schematic drawing for the electrical system for the engine on which they are working.

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## 6. Small Gas Engine Cooling and Lubrication Systems

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Students will review the cooling and lubrication systems related to the small gas engine. The splash lubrication system will be compared to the pressurized pump lubrication system normally found in larger car engines. The lubrication system will also be examined for its cooling effects on the engine. The air cooled system found on most small gas engines will be compared to the liquid cooling systems also found on larger internal combustion engines.

## Unit Assignment(s):

Working in pairs or teams students will construct a model of one of the following and present it to the class. A splash lubrication system, a pump (pressurized) lubrication system, an air cooled system, or a liquid radiator cooling system will be assigned or selected for the model making assignment. Students will also explain in a presentation how the engine they are working on is cooled and lubricated.

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## 7. Small Gas Engine Fuel System

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Students will learn about fuel systems related to small gas engines. Carburation is the most popular type at this point in time. However, fuel injection will be explored and covered.

## Unit Assignment(s):

Working in pairs or teams students will construct a model and present it to the class of one of the following: A gravity fed carbureted fuel system, a pressurized carbureted fuel system, or a pressurized injected fuel system.

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## 8. 4-Stroke (OHV-head) Engine Assembly

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After learning about the different systems and parts students will assemble the 8 HP OHV-engine that they disassembled earlier. An engine repair manual will be consulted for specifications related to the assembly procedures.

## Unit Assignment(s):

Students will assemble an 8 HP “OHV” engine.

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## 9. Air Cooled Engine and Equipment Service

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Students will learn about trouble shooting equipment problems and scheduling a repair and service for such equipment. A service and repair guide sheet will be used. They will learn how to write a work order, create a parts order, review customer service procedures, and bill out costs for a typical small gas engine service. Students will learn how to clean cooling fins, change oil, change or service the air filter, check the spark plug, and test run equipment.

## Unit Assignment(s):

In pairs or teams students will be assigned equipment and engines to diagnose and repair or service. Following a service guide sheet students will familiarize write a work order, and create a parts order, review customer service procedures, and bill out costs for small gas engine equipment. Students will consult repair manuals and trouble shoot problems to repair and service assigned equipment.

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# Course Materials

## Textbooks

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Title	Author	Publisher	Edition	Website	Primary
Small Gas Engines	Alfred C. Roth, Blake J. Fisher, W. Scott Gauthier	Goodheart-Willcox	11 ed. 2017	[ empty ]	Yes