

# 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>
		Sm Gas EngA (P)	IT6685
		Sm Gas EngB (P)	IT6686

<b>Title:</b>	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>	None (Recommended)
<b>Co-requisites:</b>	None
<b>Integrated (Academics / CTE)?</b>	Yes
<b>Grade levels:</b>	9th, 10th, 11th, 12th

# Course Description

## Course overview:

Small Gas Engines is a competency based class designed as an introductory small gas engine mechanic course that introduces students to service and repair systems. It provides students with project-based experiences in small gas engine technologies. Instruction includes an orientation, classroom and workplace policies and procedures, resource management, measurements, tools and equipment, and employ-ability skills. Emphasis is placed on 2-stroke and 4-stroke engine designs, engine cooling systems, engine lubrication systems, engine electricity, charging systems, and starting systems.

This course will also provide students with the opportunity to apply and extend concepts studied in their math and science classes (related to algebra, basic arithmetic, physics, and electrical, computer, and chemical sciences) to the small gas engine technology industry.

## Course content:

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### 1. History & Careers: The History, Careers, Certifications, and Basic Overview of Small Gas Engine Technologies

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Students will research the history and origins of Small Gas Engine Technology and appreciate the rich history of Small Gas Engine Technology as a profession or career option. They will review key historical concepts of the Small Gas Engine Industry. Students will research the background of small gas engine uses the necessary requirements for a variety of small gas engine careers, the opportunities available for a professional small gas engine service technician, and certification criteria.

#### Unit Assignment(s):

In a report or presentation format students will describe the different occupations in the Small Gas Engine Industry sector and related automotive technician options. Students will choose a specific career option to emphasize in their report.

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### 2. Outdoor 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):

Activity or Assignment: 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. 2-Stroke and 4-Stroke Air Cooled Engines**

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Students will explore Engine design and theory for both the 2-stroke and 4-stroke engine. Students will learn about internal combustion engine theory and the related internal engine components. The fuel system, cooling system, Electrical system, and lubrication systems will be introduced.

#### **≡ Unit Assignment(s):**

In pairs or teams students will create and present a PowerPoint presentation of an assigned engine system or engine type (2-stroke or 4-stroke operation).

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### **5. 4-Stroke (L-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 a 3.5 HP “L-head” engine and identify the systems as well as the engine parts.

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## 6. Small Gas Engine Electrical System

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Students will learn about electrical theory and practice 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 simple circuit and using multimeters measure and record voltage and resistance of both a parallel and series circuit.

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## 7. Small Gas Engine Cooling and Lubrication Systems

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Students will learn about 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 and present it to the class of one of the following: 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.

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

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After learning about the different systems and parts students will assemble the 3.5 HP 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 a 3.5 HP “L-head” engine.

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## 9. Air Cooled Engine Service

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Students will learn about a service guide sheet, familiarize themselves with industry practices. 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):

Following a service guide sheet students will familiarize themselves with industry practices, write a work order, and create a parts order, review customer service procedures, and bill out costs for a typical small gas engine service. Students will clean cooling fins, change oil, change or service the air filter, check the spark plug, and test run 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

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