# Small Gas Engines Course No. 18410 Credit: 1.0

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| --- | --- | --- | --- |
| **Student name:**  |  | **Graduation Date:** |  |

Pathways and CIP Codes:Power, Structural & Technical Systems (01.0201)

Course Description:

Directions:The following competencies are required for full approval of this course. Check the appropriate number to indicate the level of competency reached for learner evaluation.

**RATING SCALE:**

4. Exemplary Achievement: Student possesses outstanding knowledge, skills or professional attitude.

3. Proficient Achievement:Student demonstrates good knowledge, skills or professional attitude. Requires limited supervision.

2. Limited Achievement:Student demonstrates fragmented knowledge, skills or professional attitude. Requires close supervision.

1. Inadequate Achievement:Student lacks knowledge, skills or professional attitude.

0. No Instruction/Training:Student has not received instruction or training in this area.

## Benchmark 1: Career Options in Small Gas Engines

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 1.1 | Identify several career opportunities in the small gas engine field.  |  |
| 1.2 | List the qualities that are essential for anyone pursuing a career in small engines.  |  |
| 1.3 | List the advantages and disadvantages of entrepreneurship.  |  |
| 1.4 | Identify the benefits of outdoor power equipment certification.  |  |
| 1.5 | Complete a personal information sheet.  |  |

## Benchmark 2: Safety in the Small Gas Engine Shop

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 2.1 | Explain why a clean, well organized shop is extremely important.  |  |
| 2.2 | List dangers associated with working in a small engine shop. |  |
| 2.3 | Explain the importance of maintaining and using tools properly.  |  |
| 2.4 | Describe methods for minimizing the risks involved in working with small engines.  |  |
| 2.5 | Explain the functions of OSHA.  |  |
| 2.6 | Complete a Shop Safety Contract / Release form. |  |
| 2.7 | Demonstrate knowledge of basic shop safety by satisfactorily completing Safety Exam  |  |

## Benchmark 3: Tools and Measuring Instruments

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 3.1 | Explain why quality tools and measuring instruments should be used when servicing small gas engines. |  |
| 3.2 | Use common hand tools properly |  |
| 3.3 | Summarize the reasons that small engine components must be measured carefully.  |  |
| 3.4 | Demonstrate several of the common measuring techniques.  |  |

## Benchmark 4: Fasteners, Sealants, and Gaskets

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 4.1 | Identify fasteners used on small gas engines and implements |  |
| 4.2 | Remove and install various fasteners correctly |  |
| 4.3 | Repair or produce internal and external threads. |  |
| 4.4 | Properly select and install fasteners.  |  |
| 4.5 | Remove, select, and install gaskets correctly |  |

## Benchmark 5: Two-Cycle and Four-Cycle Engines

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 5.1 | Describe four-stroke cycle engine operation and explain the purpose of each stroke.  |  |
| 5.2 | Explain the concept of valve timing |  |
| 5.3 | Compare the lubrication system in a four-cycle engine to the system in a two-cycle engine |  |
| 5.4 | Describe two-stroke cycle engine operation and explain the principles of two-cycle operation |  |
| 5.5 | List the advantage and disadvantages of two-cycle and four-cycle engines. |  |

## Benchmark 6: Engine Construction and Principles of Operation

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 6.1 | Explain simple engine operation.  |  |
| 6.2 | List the qualities of gasoline that make it an efficient fuel for small engines.  |  |
| 6.3 | Explain why gasoline is atomized in the small engine.  |  |
| 6.4 | Identify the basic components of a small engine and describe the function of each part.  |  |

## Benchmark 7: Measuring Engine Performance

### Competencies

| **#** | **Description** | **RATING** |
| --- | --- | --- |
| 7.1 | Define engine performance |  |
| 7.2 | Define and compute bore, stroke, displacement, compression ratio, force, work, power, energy, and horsepower.  |  |
| 7.3 | Differentiate between the various types of horsepower |  |
| 7.4 | Explain the function of a Prony brake and a dynamometer. |  |
| 7.5 | Define and calculate torque |  |
| 7.6 | Explain volumetric efficiency, practical efficiency, mechanical efficiency, and thermal efficiency. |  |

## Benchmark 8: Engine Inspection, Disassembly, and Cylinder Reconditioning

### Competencies

| **#** | **Description** | **RATING** |
| --- | --- | --- |
| 8.1 | Inspect engines for problems.  |  |
| 8.2 | Describe the procedure for removing an engine from an implement. |  |
| 8.3 | List the steps involved in disassembling an engine.  |  |
| 8.4 | Measure cylinder conditions such as wear and out-of-roundness.  |  |
| 8.5 | Explain the procedures involved in reboring a cylinder.  |  |
| 8.6 | Summarize the reasons for honing a cylinder.  |  |

## Benchmark 9: Piston and Piston Ring Service

### Competencies

| **#** | **Description** | **Rating** |
| --- | --- | --- |
| 9.1 | Describe piston and piston ring compression.  |  |
| 9.2 | Differentiate between compression rings and oil control rings. |  |
| 9.3 | Explain the purpose of ring end gap |  |
| 9.4 | Identify common types of piston damage and list possible causes.  |  |
| 9.5 | Summarize what happens during piston ring wear-in. |  |
| 9.6 | Explain the purpose of a piston pin. |  |

## Benchmark 10: Fuel and Emission Control Systems

### Competencies

| **#** | **Description** | **rating** |
| --- | --- | --- |
| 10.1 | Describe the function of the connecting rod and the bearings.  |  |
| 10.2 | Define bearing spread and bearing crush.  |  |
| 10.3 | Differentiate between friction bearings and antifriction bearings.  |  |
| 10.4 | Summarize the function of the crankshaft. |  |
| 10.5 | Service conventional and overhead valve assemblies.  |  |
| 10.6 | Explain the operation of ports, reeds, and rotary valves.  |  |
| 10.7 | Describe the purpose of the camshaft. |  |
| 10.8 | Explain the purpose of an automatic compression release.  |  |

## Benchmark 11: Fuel and Emission Control Systems

### Competencies

| **#** | **Description** | **Rating** |
| --- | --- | --- |
| 11.1 | Name various types of fuel that can be used in a small engine and list practical applications for each. |  |
| 11.2 | Explain the importance of proper fuel-oil mixture in a two-cycle engine.  |  |
| 11.3 | Describe the purpose of fuel filters.  |  |
| 11.4 | Explain fuel pump operation. |  |
| 11.5 | Describe the operation of a pressurized fuel system.  |  |
| 11.6 | Explain the importance of emission control |  |

## Benchmark 12: Carburetion

### Competencies

| **#** | **Description** | **Rating** |
| --- | --- | --- |
| 12.1 | List and explain the principles of carburetion.  |  |
| 12.2 | Identify the three basic types of carburetors. |  |
| 12.3 | Explain float-type carburetor operation.  |  |
| 12.4 | Explain the operation of the diaphragm-type carburetors.  |  |
| 12.5 | Define manual throttle controls |  |
| 12.6 | List the basic functions of a governor. |  |
| 12.7 | Adjust and maintain common governors.  |  |
| 12.8 | Describe the purpose of an air cleaner.  |  |

## Benchmark 13: Fuel System Service

### Competencies

| **#** | **Description** | **Rating** |
| --- | --- | --- |
| 13.1 | Test a fuel pump for proper operation.  |  |
| 13.2 | Summarize basic carburetor adjustments. |  |
| 13.3 | Test two-cycle engine reeds for leakage.  |  |
| 13.4 | Explain basic procedures for inspecting, overhauling, and adjusting diaphragm and float-type carburetors.  |  |
| 13.5 | Troubleshoot flat-type and diaphragm-type carburetors |  |

## Benchmark 14: Ignition System

### Competencies

| **#** | **Description** | **Rating** |
| --- | --- | --- |
| 14.1 | List the primary purposes of the ignition system. |  |
| 14.2 | Identify the components in a typical magneto system and describe the function of each part. |  |
| 14.3 | Describe small engine ignition advance systems.  |  |
| 14.4 | List the advantages of a solid state ignition system. |  |
| 14.5 | Identify the three general classifications of magneto ignition systems and explain the operation of each.  |  |
| 14.6 | Describe the operation of a battery ignition system.  |  |

## Benchmark 15: Ignition System Service

### Competencies

| **#** | **Description** | **Rating** |
| --- | --- | --- |
| 15.1 | Examine spark plug deposits for signs of abnormal combustion. |  |
| 15.2 | Clean, gap, and install spark plugs correctly.  |  |
| 15.3 | Explain the basic inspections and tests used to verify proper ignition system operation.  |  |
| 15.4 | Adjust breaker points, piston height, and ignition spark timing.  |  |
| 15.5 | Explain basic tests for breaker point and solid state ignition systems.  |  |
| 15.6 | Explain typical service procedures for battery ignition systems.  |  |

## Benchmark 16: Lubrication Systems

### Competencies

| **#** | **Description** | **Rating** |
| --- | --- | --- |
| 16.1 | Define friction and explain how it affects the internal engine components.  |  |
| 16.2 | List the functions of lubricating oil.  |  |
| 16.3 | Differentiate between the lubrication systems in two-cycle engines and four-cycle engines. |  |
| 16.4 | Explain the operation of ejection pumps, barrel pumps, and positive displacement pumps.  |  |
| 16.5 | Explain the function oil filter systems and differentiate between the three main types  |  |

## Benchmark 17: Cooling Systems

### Competencies

| **#** | **Description** | **Rating** |
| --- | --- | --- |
| 17.1 | Explain how air cooling, exhaust cooling, and water cooling work to lower engine operating temperatures.  |  |
| 17.2 | Define the basic function of a water pump and give examples of several common types |  |
| 17.3 | Describe the basic operation of outboard water circulation systems.  |  |
| 17.4 | Explain the function of a thermostat and a radiator. |  |

## Benchmark 18: Click or tap here to enter text.

### Competencies

| **#** | **Description** | **Rating** |
| --- | --- | --- |
| 18.1 | Explain the function of a thermostat and a radiator. |  |
| 18.2 | Change the oil in a four-cycle engine. |  |
| 18.3 | Mix fuel and oil correctly for a two-cycle engine. |  |
| 18.4 | Perform preventive maintenance on various engine systems; including the crankcase breather, air cleaner, and muffler. |  |
| 18.5 | Prepare a water cooling system for storage.  |  |
| 18.6 | Describe systematic troubleshooting |  |
| 18.7 | Use manufacturer’s service manuals to determine engine specifications and explain why this information is necessary when servicing a small engine |  |

I certify that the student has received training in the areas indicated.

Instructor Signature:

For more information, contact:

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