SMALL ENGINES

Course Information

Grade Level:	9-12
Length:	1 Semester
Period(s) Per Day:	1

Course Description

Small Engines is an introductory course to the systems that harness power in our technical society. Emphasis is on the mechanical processes of the two and four stroke engine. Students will develop the skills and knowledge of identification, disassembly, inspection, repair, and operation of a wide variety of mechanically driven engines. Students will be required to build three small engines. Students will be responsible for the purchasing and ordering of spare parts needed to complete their live engine projects.

Course Objectives and Expectations

1. Students will learn to work safely in the automotive shop.
2. Students will learn about the tools and equipment used in the industry and how to use them correctly.
3. Students will learn about the composition and purpose of common engine fasteners and gaskets.
4. Students will learn basic measurement and math used in the automotive repair industry.
5. Students will learn to identify engine parts and their functions.
6. Students will learn common diagnostic processes and testing related to small gas engines.
7. Students will learn procedures to disassemble, inspect, and rebuild small gas engines.

Student Objectives

1. Perform correct operations of tools and equipment in the shop safely and efficiently.
2. Identify all the internal parts of an engine, identify lubrication system parts, cooling system parts, starting and charging system parts.
3. Describe the operation of both two and four stroke engines and related assemblies.
4. Maintain and service all needed parts of a small gas engine.
5. Perform a successful overhaul on small gas engines and related assemblies.
6. Troubleshoot and diagnose problems related to small gas engines and do what is necessary to correct the problem the first time.
7. Maintain and clean the small gas engine shop and related tools while working in a professional manner.
8. Order and research parts related to small engines while utilizing local resources.

Pacing ***Career and Vocational/Technical Standards***

Quarter 1 & 2

Unit 1 – Safety in the Automotive Shop	1.II.1, 4.II.2, 4.II.3
Unit 2 – Tools/equipment used in industry	1.II.1, 4.II.3, 4.II.4
Unit 3 – Fasteners/Gaskets used in industry	1.II.1, 5.II.4
Unit 4 – Basic Automotive measurement and math	1.II.1, 4.II.1
Unit 5- Small Engine parts ID and operation	4.II.5
Unit 6 – Honda GCV190 Engine overhaul	1.II.1, 2.II.2, 2.II.3, 2.II.4, 3.II.1, 3.II.2, 4.II.1, 4.II.2, 5.II.1
Unit 7 – Kohler XT-7 Engine overhaul	1.II.1, 2.II.2, 2.II.3, 2.II.4, 3.II.1, 3.II.2, 4.II.1, 4.II.2, 5.II.1
Unit 8 – Preventive Maintenance and Troubleshooting	4.II.5, 4.II.4, 5.II.3
Unit 9 – Live Engine project overhaul	1.II.1, 2.II.2, 2.II.3, 2.II.4, 3.II.1, 3.II.2, 4.II.1, 4.II.2, 5.II.1

1st Quarter

Safety in the Automotive Shop
- A. Shop Safety
- B. Keep work area clean
- C. Use tools properly
- D. Operate Engines safely

Tools/equipment used in industry
- A. Basic hand tools
- B. Measuring tools
- C. Power tools
- D. Specialty tools and shop equipment

Fasteners/Gaskets used in industry
- A. Threaded/non threaded Fasteners
- B. Bolt and nut terminology
- C. Tightening to specific torque setting
- D. Thread repairs

Basic Automotive measurement and math
- A. Standard and Metric measurement
- B. Part measurement
- C. Part clearances
- D. Measurement calculations

Small Engine parts ID and operation
- A. Gasoline Engines
- B. Basis for an Engine
- C. Cylinder block, crankshaft and crankcase, pistons, intake and exhaust ports, valve-train

D. Small engine identification

Honda Engine Overhaul

A. Inspection and disassembly
B. Inspection, cleaning and failure analysis
C. Inspection and measuring techniques
D. Inspection and reassembly
E. Engine checkup and tuning

2nd Quarter

Kohler Engine Overhaul

A. Inspection and disassembly
B. Inspection, cleaning and failure analysis
C. Inspection and measuring techniques
D. Inspection and reassembly
E. Engine checkup and tuning

Preventive Maintenance and Troubleshooting

A. Keeping engines clean
B. Systematic Troubleshooting
C. Operating Requirements
D. Service Information

Live Engine Project Overhaul

A. Inspection and disassembly
B. Inspection, cleaning and failure analysis
C. Inspection and measuring techniques
D. Inspection and reassembly
E. Engine checkup and tuning

Timeline	***Approximate Time to Cover***
Unit 1 - Safety in the Automotive Shop	(1 week to cover)
Unit 2 - Tools/equipment used in the industry	(1 week to cover)
Unit 3 - Fasteners/Gaskets used in the industry	(1 week to cover)
Unit 4 - Basic Automotive measurement and math	(1 week to cover)
Unit 5 - Small Engine parts ID and operation	(2 weeks to cover)
Unit 6 - Honda GCV190 Engine overhaul	(4 weeks to cover)
Unit 7 - Kohler XT-7 Engine overhaul	(4 weeks to cover)
Unit 8 - Preventive Maintenance and Troubleshooting	(1 week to cover)
Unit 9 - Live Engine project overhaul	(4 weeks to cover)
Total =	(19 weeks to cover)

Montana Content Standards/RST

Content Standard 1: Students experience various career opportunities and assess personal career pathways.

Benchmark II. 1. Explore and identify personal interests, aptitudes, and abilities and develop strategies to achieve tentative career goals.

Content Standard 2: Students demonstrate an understanding and apply principles of Resource Management (i.e. financial, time, personal management).

Benchmark II.2. Prioritize, allocate time, prepare and follow schedules to complete a project.
Benchmark II.3. Apply appropriate time to task.
Benchmark II.4. Use physical resources wisely to accomplish a goal.

Content Standard 3: Students experience various career opportunities and assess personal career pathways.

Benchmark II.1. Demonstrate active leadership skills by participation in group activities and projects.
Benchmark II. 2. Demonstrate positive personal and work ethics.

Content Standard 4: Students acquire and demonstrate current technical skills leading to an occupation.

Benchmark II.1. Practice technical skills and procedures required for an occupation.
Benchmark II.2. Practice safe and appropriate use of technology.
Benchmark II.3. Select the appropriate tools, equipment, and procedures for the task.
Benchmark II.4. Manage and maintain technological tools and follow troubleshooting protocol.
Benchmark II.5. Apply technical information to a variety of sources.

Content Standard 5: Students know and demonstrate the requirements of the workplace through authentic application.

Benchmark II.1. Practice and demonstrate academic and technical skills to a workplace setting.
Benchmark II.3. Identify the possible outcomes and consequences of decisions.
Benchmark II.4. Use acceptable industry standard equipment in a school setting.

Resources

http://opi.mt.gov/pdf/Standards/ContStds-CareerTech.pdf