

# EASTERN ARIZONA COLLEGE

## Small Engines

Course Design

2016-2017

### Course Information

**Division** Industrial Technology Education  
**Course Number** AUT 104  
**Title** Small Engines  
**Credits** 2-3  
**Developed by** Brian Coppola  
**Lecture/Lab Ratio** 2 Credits = 1 Lecture/3 Lab  
3 Credits = 1 Lecture/4 Lab

### Transfer Status

ASU	NAU	UA
Non Transferable	CTE Departmental Elective	Non Transferable

**Activity Course** No  
**CIP Code** 47.0604  
**Assessment Mode** Pre/Post Test (25 Questions/100 Points)  
**Semester Taught** Upon Request  
**GE Category** None  
**Separate Lab** No  
**Awareness Course** No  
**Intensive Writing Course** No

### Prerequisites

None

### Educational Value

This course is designed for students interested in acquiring knowledge and skill in the repair and maintenance of small engines.

### Description

Provides operational principles, diagnosis, service, and overhaul procedures of small two-stroke and four-stroke gasoline engines.

### Supplies

Safety glasses  
Student notebook/folder

## **Competencies and Performance Standards**

### **1. Apply proper safety procedures and processes.**

#### **Learning objectives**

*What you will learn as you master the competency:*

- a. Acquaint self with shop environment and hazards.
- b. Acquaint self with emergency procedures and policy.
- c. Accept responsibility for personal well-being and practice and follow safety guidelines.
- d. Acquaint self with material safety data sheets and chemical used in shop.

#### **Performance Standards**

*Competence will be demonstrated:*

- o in completing safety assignments and written exam at a satisfactory level

*Criteria - Performance will be satisfactory when:*

- o learner observes and practices safety procedures

### **2. Diagnose engine that turns over but does not start.**

#### **Learning objectives**

*What you will learn as you master the competency:*

- a. Test small engine's fuel and ignition systems.
- b. Test the mechanical condition of small engine.

#### **Performance Standards**

*Competence will be demonstrated:*

- o in completing NATEF aligned assignments and job sheets listed in the related learning plan (the assignment and job sheets must be completed at a satisfactory level to the instructor)
- o in performing the priority NATEF tasks listed in the related learning plan (the tasks must be completed with limited supervision - entry level)

*Criteria - Performance will be satisfactory when:*

- o learner is productive, works safely, and in a professional manner while working on NATEF task requirements listed in related learning plan
- o learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on the NATEF task requirements listed in related learning plan
- o learner actively participates in the NATEF task requirements listed in the related learning plan
- o learner attends required class and lab sessions and shows up on time

### **3. Perform periodic maintenance/service on small engine.**

#### **Learning objectives**

*What you will learn as you master the competency:*

- a. Perform preventative maintenance services required to keep small engine in proper operating order.
- b. Perform preventative maintenance services identified by manufacturer.

### **Performance Standards**

*Competence will be demonstrated:*

- in completing NATEF aligned assignments and job sheets listed in the related learning plan (the assignment and job sheets must be completed at a satisfactory level to the instructor)
- in performing the priority NATEF tasks listed in the related learning plan (the tasks must be completed with limited supervision - entry level)

*Criteria - Performance will be satisfactory when:*

- learner is productive, works safely, and in a professional manner while working on NATEF task requirements listed in related learning plan
- learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on the NATEF task requirements listed in related learning plan
- learner actively participates in the NATEF task requirements listed in the related learning plan
- learner attends required class and lab sessions and shows up on time

## **4. Perform major overhaul/rebuild repair on small engine.**

### **Learning objectives**

*What you will learn as you master the competency:*

- a. Demonstrate an ability to disassemble, clean, inspect, and reassemble a small engine according to manufacturer's requirements.

### **Performance Standards**

*Competence will be demonstrated:*

- in completing NATEF aligned assignments and job sheets listed in the related learning plan (the assignment and job sheets must be completed at a satisfactory level to the instructor)
- in performing the priority NATEF tasks listed in the related learning plan (the tasks must be completed with limited supervision - entry level)

*Criteria - Performance will be satisfactory when:*

- learner is productive, works safely, and in a professional manner while working on NATEF task requirements listed in related learning plan
- learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on the NATEF task requirements listed in related learning plan
- learner actively participates in the NATEF task requirements listed in the related learning plan
- learner attends required class and lab sessions and shows up on time

## **5. Perform required measurements and inspection processes to small engine components.**

### **Learning objectives**

*What you will learn as you master the competency:*

- a. Demonstrate an ability to identify worn or bad small engine components using visual and precision measure techniques.

### **Performance Standards**

*Competence will be demonstrated:*

- in completing NATEF aligned assignments and job sheets listed in the related learning plan (The assignment and job sheets must be completed at a satisfactory level to the instructor)
- in performing the priority NATEF tasks listed in the related learning plan (The tasks must be completed with limited supervision - entry level)

*Criteria - Performance will be satisfactory when:*

- learner is productive, works safely, and in a professional manner while working on NATEF task requirements listed in related learning plan
- learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on the NATEF task requirements listed in related learning plan
- learner actively participates in the NATEF task requirements listed in the related learning plan
- learner attends required class and lab sessions and shows up on time

### **Types of Instruction**

Classroom Presentation

Lab

Simulated or Actual Work Experience

Totals

### **Grading Information**

#### **Grading Rationale**

Lab=45%

Class (Includes Test and Assignments)=45%

Final Exam (Post Test is the Final)=10%

Class score calculation:

Quizzes, assignments and job sheet points shall be added and carry a weight equal to one test score.

All exams except the final shall have equal weight (test scores averaged) and used in class score calculations.

The final (post test) will be worth at least 10% of the overall final grade calculation.

Lab score calculation:

Instructor should evaluate each student's work habits using lab time card.

Each student should be evaluated on productivity and progress on task requirements, working in a professional manner, clean-up and safe work habits. Instructor is also required to evaluate each student's skill level in achieving the NATEF task requirement outlined in the various learning plans.

Instructors are encouraged to reward students for showing up on time and attending each class and lab session. This can be done by requiring students to make arrangements with the instructor to make-up any lost time prior to missed day. All students need to notify the instructor of sick days through voice mail, etc. on the day of sickness. Instructors should not allow for any work to be turned in late or any test made up without some type of deduction for late assignments/test. Suggested deduction 50% of original score.

**Grading Scale**

A 90%-100%

B 80%-89%

C 70%-79%

D 60%-69%

F Below 60 %

P A non-major student may choose to have a grade of P or F rather than a letter grade. A grade of P will require that the student receive a percentage grade of at least 68%. A grade less than this will result in a grade of F.

## **Learning Plan**

### **Safety**

#### **Overview**

In this learning plan you will develop the knowledge needed to work safely in a shop environment. You will learn safety procedures, the location of safety equipment, and the safety features of various shop equipment. The instruction will cover general shop safety processes, fire safety, battery safety, lifting procedures, and health-related hazards.

#### **1. Apply proper safety procedures and processes.**

##### **Learning Activities**

- \_\_\_\_ 1. Complete a worksheet/assignment sheet.
  
- \_\_\_\_ 2. Collect a current article that relates to concepts and issues about which you are studying.
  
- \_\_\_\_ 3. Listen and observe a lecture covering safety procedures and practices - review a safety and hazards video.
  
- \_\_\_\_ 4. Operate hoist, floor jack (jack stands) and any equipment needed during assigned lab activities.
  
- \_\_\_\_ 5. Identify location of safety equipment, first-aid kit, phone, fire blanket, fire extinguishers, exits, light switches, and vents.

##### **Assessment Activities**

- \_\_\_\_ 1. Participate in safety discussion.
  
- \_\_\_\_ 2. Complete activities in lesson.
  
- \_\_\_\_ 3. Complete written safety test.

**Learning Plan**  
**No-Start Concern**

**Overview**

To diagnose engine that turns over but does not start concern.

**2. Diagnose engine that turns over but does not start concern.**

**Learning Activities**

- \_\_\_\_ 1. Check for fuel delivery to carburetor.
  
- \_\_\_\_ 2. Check for fuel mixture within combustion.
  
- \_\_\_\_ 3. Check for proper spark and spark timing.
  
- \_\_\_\_ 4. Complete compression test.
  
- \_\_\_\_ 5. Identify failed component that caused no start.
  
- \_\_\_\_ 6. Repair failed components causing no start.
  
- \_\_\_\_ 7. Demonstrate the ability to locate and use manufacturer's service/reference materials.

**Assessment Activities**

- \_\_\_\_ 1. Participate in discussion of subject matter. Listen, take notes, watch demonstration and discuss material in lesson.
  
- \_\_\_\_ 2. Complete all required activities. Complete job sheet for checking compression, spark and fuel.

## **Learning Plan**

### **Maintenance/Service**

#### **Overview**

To perform periodic maintenance/service on small engine.

### **3. Perform periodic maintenance/service on small engine.**

#### **Learning Activities**

- \_\_\_\_ 1. Change oil on small engine.
  
- \_\_\_\_ 2. Change and gap spark plug.
  
- \_\_\_\_ 3. Winterize fuel system.
  
- \_\_\_\_ 4. Clean or replace fuel filter.
  
- \_\_\_\_ 5. Clean or replace air and breather filters.
  
- \_\_\_\_ 6. Lube and adjust any linkages and cables.
  
- \_\_\_\_ 7. Demonstrate the ability to locate and use manufacturer's service/reference materials.

#### **Assessment Activities**

- \_\_\_\_ 1. Participate in discussion of subject matter. Listen, take notes, watch demonstration and discuss material in lesson.
  
- \_\_\_\_ 2. Complete all required activities. Complete required PM service.
  
- \_\_\_\_ 3. Complete all required test covering PM service and engine operational theory.



## **Learning Plan**

### **Major Overhaul/Rebuild**

#### **Overview**

To perform major overhaul/rebuild repair on small engine.

#### **4. Perform major overhaul/rebuild repair on small engine.**

#### **Learning Activities**

- \_\_\_\_ 1. Remove and reinstall small engine.
  
- \_\_\_\_ 2. Disassemble all components and attachments.
  
- \_\_\_\_ 3. Clean all components.
  
- \_\_\_\_ 4. Visually inspect and precisely measure components to identify unusual wear.
  
- \_\_\_\_ 5. Assemble and lube components per manufacturer's requirements.
  
- \_\_\_\_ 6. Prep and set-up engine and start.
  
- \_\_\_\_ 7. Demonstrate the ability to locate and use manufacturer's service/reference materials.

#### **Assessment Activities**

- \_\_\_\_ 1. Participate in discussion of subject matter. Listen, take notes, watch demonstration and discuss material in lesson.
  
- \_\_\_\_ 2. Complete all required activities. Complete job sheet for overhaul inspections.
  
- \_\_\_\_ 3. Complete all required test covering engine disassembly, inspection and assembly process.

## **Learning Plan**

### **Measurements and Inspection**

#### **Overview**

To perform required measurements and inspection processes to small engine components.

#### **5. Perform required measurements and inspection processes to small engine components.**

#### **Learning Activities**

- \_\_\_\_ 1. Locate and use component specification.
  
- \_\_\_\_ 2. Locate and use tightening specification and sequences.
  
- \_\_\_\_ 3. Locate and use components assembly techniques listed.
  
- \_\_\_\_ 4. Locate and use ignition and fuel system set-up techniques.
  
- \_\_\_\_ 5. Demonstrate the ability to locate and use manufacturer's service/reference materials.

#### **Assessment Activities**

- \_\_\_\_ 1. Participate in discussion of subject matter. Listen, take notes, watch demonstration and discuss material in lesson.
  
- \_\_\_\_ 2. Complete all required activities. Complete assignment and job sheets related to various precision tooling and inspection procedures.
  
- \_\_\_\_ 3. Complete all required test covering component measurement and measuring tooling usage.