Course ID Number: AUTO 089

Course Title: Advanced Air-Cooled and Small Engines

Course Description: Provides advanced information on the construction and operation of one and two cylinder, two and four cycle, gas powered engines. Detailed information on maintaining, troubleshooting, repairing, and rebuilding small engines.

Prerequisite(s): AUTO 088

Rationale:

Course ID Number: Deleting the repeatability (#3) on AUTO 089 to conform with the current curriculum requirements.

Course Title and Description: Rewriting the course title and description to reflect the latest changes in technology.

Prerequisite(s): Because AUTO 089 is an advance course, students need to have the basic principles of AUTO 088 to be able to comprehend the content of AUTO 089.

Last updated: 3/99

SAN BERNARDINO VALLEY COLLEGE
COURSE OUTLINE

I. CATALOG DESCRIPTION:
Division: Technical Department: Automotive
Course ID Number: AUTO 089
Course Title: Advanced Air-Cooled and Small Engines
Hours: Lecture 3 Hours/Week
Lab 3 Hours/Week
Units: 4
Course Description: Provides advanced information on the construction and operation of one and two cylinder, two and four cycle, gas powered engines. Detailed information on maintaining, troubleshooting, repairing, and rebuilding small engines.
Prerequisite(s): AUTO 088
Corequisite(s): None

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: One

III. EXPECTED OUTCOMES FOR STUDENTS:
Upon completion of this course, students will be able to:

A. Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals in accordance with local, state, and federal safety and environmental regulations including, but not limited to, the regulatory departments such as the Occupational Safety and Health Act (OSHA), Bureau of Automotive Repair (BAR), South Coast Air Quality Control Board (SCAQCB), Environmental Protection Agency (EPA).
B. Compare the design, operating principles, and the component parts of the two and four stroke engine, 3 HP to 4 liter engines.
C. Disassemble, inspect, measure, and repair parts which are reusable in a manner consistent with accepted trade practice.
D. Assemble an engine in accordance with manufacturer instructions and specifications and identify and order new engine parts as needed.
E. Evaluate the design, operation, and component parts of engine fuel systems and perform normal servicing of the fuel system in a manner consistent with accepted industry standards.
F. Recognize the importance of a properly tuned engine, perform all necessary adjustments, demonstrate sequential steps taken in diagnosing tune-up problems, and remove and replace components in a manner consistent with accepted industry standards.
G. Inspect and analyze the cause or failure of defective engine components in a manner consistent with accepted trade practice.

IV. CONTENT:

A. Shop Safety
   1. General shop safety
   2. Automotive Department safety and agreement policy
   3. Technical Division safety statement/agreement
   4. Accepted practices and procedures
   5. Safe use of pneumatic, hydraulic, and electric tools and equipment
   6. Safe use of parts cleaning equipment
   7. Preparation and response to natural disasters in the work place
   8. Recognition, handling, and legal disposal of hazardous materials
   9. Safety tips for using hand tool
   10. Safety tips for technicians
   11. Material Safety Data Sheets (MSDS)
   12. Safety in lifting

B. Orientation/General Information
   1. Certificates (College and NATEF/ASE)
   2. Course Syllabus
   3. Required materials
   4. Grading system
   5. Policies and procedures
   6. Career Opportunities
   7. Salary and benefits
   8. Employer/Employee expectations

C. Ignition Systems
   1. Types of systems
   2. Battery ignition systems
   3. Magneto systems
   4. Capacitor discharge and solid state ignition systems

D. Fuel Systems
   1. Carburetion
   2. Air fuel mixtures
   3. System components
   4. Float type carburetors
   5. Diaphragm type carburetors
   6. Suction type carburetors

E. Principles of Fuel Injection
   1. Gas fuel injection
   2. Diesel fuel injection

F. Exhaust, Lubricating, and Cooling Systems
   1. Exhaust systems
      a. Maintenance
      b. Troubleshooting
   2. Lubricating systems
      a. Maintenance
      2. Troubleshooting
   3. Heat and its relation to an engine
   4. Air cooled engines
   5. Water cooled engines

G. Charging Systems

1. Generator systems
2. Alternator systems
3. Fixed field charging systems
4. Rectifying AC to DC current

H. Starting Systems
1. Battery starting systems
2. Rewind starters
3. Combination starter generator systems

V. METHODS OF INSTRUCTION:
The methods of instruction will include, but are not limited to, classroom lectures, direct demonstration by instructor, guided practice by the learner and presentation by factory video programs.

VI. TYPICAL ASSIGNMENTS:
A. After completion of assigned reading, answer designated review questions.
Typical Questions:
1. List the three most common failures of camshafts.
2. Name the major components of the four stroke cycle.

B. Students will demonstrate college level writing competency by writing a comprehensive failure analysis report about a selected engine component.
C. Diagnose a leaky exhaust system and make needed repairs.
D. Measure current output and voltage level of a charging system.
E. Fill in appropriate blank on a standard repair order.
F. Explain needed engine repairs to a typical customer.

VII. EVALUATION:
A. Methods of Evaluation:
1. Oral and written tests
2. Completion of lab exercises in accordance with manufacturers specifications and procedures
3. Comprehensive written final exam
Typical Questions:
a. Explain the procedure for cylinder leakage testing.
b. Explain the need for eye safety protection in the lab.

B. Frequency of Evaluation:
1. Three quizzes covering reading assignments
2. Three unit tests
3. Weekly progress evaluations of lab exercises
4. End of semester final exam

VIII. TYPICAL TEXT(s):

Title:	Small Gas Engines
Author:	Alfred C. Roth
Publisher:	Goodheart-Wilcox
Date of Publication:	1998

IX. OTHER SUPPLIES REQUIRED OF STUDENTS:

A. Notebook
B. Safety glasses

Last updated: 3/99

Step 3, Form A

Content Review Form
PREREQUISITE COURSE

Target Course: AUTO 089 Advanced Air-Cooled and Small Engines

Prerequisite Course: AUTO 088 Air-Cooled and Small Engines

Instructions:
List exit competencies (skills) from Prerequisite Course. These skills are listed in the "Student Outcomes" section of the Course Outline ("upon completion of the course, the student should be able to…")
Indicate which of the listed exit competencies (skills) are necessary entry skills needed for success in the target course. Mark with an "X" each needed skill.
Indicate the degree of importance of each needed entry skill for course success, using the following rating scale:

1=Critical 2=Very Helpful 3=Desirable

Skills Analysis

	Exit Skills in Prerequisite Course	Entry Skills Needed for Success in Target Course (Mark with an X if needed.)	Degree of Importance (Rate 1 – 3)
1.	Compare the design, operating principles and the component parts of the two and four stroke engine, 50 CC to 2.9 liter engines.	X	1
2.	Disassemble, inspect, measure, and repair parts which are reusable in a manner consistent with accepted trade practice.	X	1
3.	Assemble an engine in accordance with manufacturer instructions and specifications.	X	1
4.	Identify and order new engine parts as needed.	X	1
5.	Evaluate the design, operation, and component parts of engine fuel systems and perform normal servicing of the fuel system in a manner consistent with accepted industry standards.	X	1
6.	Recognize the importance of a properly tuned engine, perform all necessary adjustments, demonstrate sequential steps taken in diagnosing tune-up problems, and remove and replace components in a manner consistent with accepted industry standards.	X	1
7.	Inspect and analyze the cause or failure of defective engine components in a manner consistent with accepted trade practice.	X	1