Last update: 8/98

SAN BERNARDINO VALLEY COLLEGE
COURSE OUTLINE

I. CATALOG DESCRIPTION:

Division **TECHNICAL** Department **AUTOMOTIVE**

Course ID Number **DIESEL 025#3**

Course Title **Heavy-equipment diesel engines laboratory**

Class Hours

Laboratory: 3 hours/week

Unit: **1**

Course Description: **Practical shop work of the construction, operation, and repair of automotive, heavy-duty, and heavy-equipment diesel engines. Includes principles of diesel fuel injection pumps, governors, and injectors; turbo-chargers and blowers; two and four cycle combustion systems.**

Schedule Description: **Practical shop work in the repair, operation, and maintenance of various heavy equipment diesel engines. Includes general trouble-shooting and diagnostic testing of engine components and systems found on Caterpillar and other engine manufacturers.**

ENTRANCE SKILLS:

Prerequisite(s): **DIESEL 024 – Heavy-Equipment Diesel Engines**
Corequisite(s): **None**

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

III. EXPECTED OUTCOMES FOR STUDENTS:

Upon completion of the course, the students will be able to:

A. Identify procedures for the safe use and care of tools and chemicals, the proper placement and storage of parts and components, and the correct protective clothing and safety gear for various situations.
B. Disassemble, inspect, and repair parts which are reusable in a manner consistent with accepted trade practices.

C. Assemble a diesel engine in accordance with manufacturer instructions and specifications. The student will identify and order new diesel engine parts as required.

D. Identify the systems design, operation, and component parts of the heavy-equipment diesel engine fuel system. The student will diagnose fuel system problems. The student will perform normal servicing of the fuel system in a manner consistent with accepted industry standards.

E. 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.

F. Inspect and analyze the cause or failure of defective engine components in a manner consistent with accepted trade practices. Heavy-equipment diesel engines refers to Caterpillar, Cummins, and Detroit Diesel engines used in: Graders, dozers, cranes, compressors, and other heavy construction equipment. The student will write a comprehensive failure analysis report about a failed engine component.

G. Identify various design, operating principles, and the component parts of the two-stroke and four-stroke diesel engine. The student will be able to differentiate the constant volume combustion cycle from the constant pressure combustion cycle.

IV. **CONTENT:**

UNIT 1: Introduction to diesel engines

a. General shop safety
b. Tools and equipment
c. Engine oil
d. Diesel fuel
e. Engine performance terminology
f. Cycle operation
g. Combustion chamber types
h. Basic engine components

UNIT 2: Diesel engine components and service

a. Cylinder block
b. Camshaft
c. Cylinder sleeve
d. Crankshaft
e. Bearings
f. Connecting rod
g. Piston and rings
h. Lubrication pump and oil cooler

i. Cylinder head and valves
j. Valve-train mechanism
k. Flywheel housing, flywheel, and timing cover
l. Engine brakes and hydraulic retarders

UNIT 3: Diesel engine systems

a. Air-intake systems
b. Exhaust systems
c. Cooling systems

UNIT 4: Diesel fuel-injection systems

a. Introduction to heavy-duty fuel-injection systems
b. Governors
c. Emission controls
d. Fuel-Injection nozzles and holders
e. Cummins fuel-injection systems
f. Detroit diesel fuel-injection systems
g. Caterpillar fuel-injection systems

Unit 5: Break-in, troubleshooting, and tune-up

a. Starting the reconditioned engine
b. Troubleshooting diesel engines
c. Diesel engine tune-up

V. METHODS OF INSTRUCTION:

The methods of instruction will include, but are not limited to:

A. Direct demonstration by instructor
B. Guided practice by the learner and presentations by field experts

VI. TYPICAL ASSIGNMENTS:

A. Disassemble, inspect, and repair parts
B. Assemble a diesel engine
C. Troubleshoot the cause or failure of defective engine components in a manner consistent with accepted trade practices

VII. EVALUATION:

A. Student progress will be evaluated by:
   1. Completion of lab exercises in accordance with manufacturers specifications
   2. Writing a comprehensive failure analysis report about a selected diesel engine component

B. Frequency of evaluation:
   1. Weekly assignments
   2. One midterm examination
   3. One final examination

VIII. **TYPICAL TEXT(S):**

Title: Diesel Fundamentals and Service, Third Edition
Author: Frank J. Thiessen, Davis N. Dales
Publisher: Prentice Hall
Date of Publication: 1997
Reading Level: Primarily college level

Title: Diesel Mechanics, Third Edition
Author: Schulz/Evridge
Publisher: Mcgraw Hill
Date of Publication: 1993
Reading Level: Primarily college level

IX. **OTHER SUPPLIES REQUIRED OF STUDENTS:**

Notebook and safety glasses