Last updated: 8/98

SAN BERNARDINO VALLEY COLLEGE

COURSE OUTLINE

I. *CATALOG DESCRIPTION*:

DIVISION: TECHNICAL
DEPARTMENT: AUTOMOTIVE

COURSE ID NUMBER: DIESEL 027#3

COURSE TITLE: Micro-computer controlled diesel engines laboratory

CLASS HOURS: 3 HOURS LABORATORY

UNITS: 1 UNITS

CATALOG DESCRIPTION: Practical shop work in the repair, operation, and maintenance of Micro-Computer Controlled diesel engines. Includes general trouble-shooting and diagnostics using assorted electronic and computerized test equipment on operable computer controlled diesel engines. General service and overhaul of the computerized 3406E Caterpillar engine is emphasized.

SCHEDULE DESCRIPTION: Practical shop work in the repair, operation, and maintenance of Micro-Computer Controlled diesel engines. General service and overhaul of the computerized 3406E Caterpillar engine is emphasized.

ENTRANCE SKILLS:

PREREQUISITE(S): DIESEL 026 – Micro-Computer Controlled Diesel Engines
COREQUISITE(S): NONE

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

III. ***EXPECTED OUTCOMES FOR STUDENTS:***

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

A. Identify 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 manufacturers instructions and specifications.
D. Identify and order new diesel engine parts as required.
E. Diagnose the fuel system using various electronic test equipment.
F. Perform routine servicing of the fuel system in a manner consistent with accepted industry standards.
G. Perform all necessary adjustments, demonstrate sequential steps performed when diagnosing tune-up problems, and remove and replace components in a manner consistent with accepted industry standards.
H. Inspect, identify, and analyze the cause or failure of defective diesel engine parts and components in a manner consistent with accepted trade practices.
I. Demonstrate college level writing competency by writing a comprehensive failure analysis report about a selected diesel engine component.

IV. ***CONTENT:***

UNIT 1: Introduction to micro-computer controlled diesel engines

a. General shop safety
b. Tools and equipment
c. Engine oil
d. Diesel fuel
e. Engine performance terminology
f. Cycle of 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 rods
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
m. Engine computer assembly
n. Computer sensors
o. Computer actuators

UNIT 3: Diesel engine systems

a. Air-intake systems
b. Exhaust systems
c. Cooling
d. Micro-computer
e. Sensor network
f. Output actuator network
g. Self-diagnosis/data systems

UNIT 4: Diesel fuel-injection systems

a. Introduction to computer-controlled diesel fuel injection systems
b. Governors
c. Emission controls
d. Fuel-injection nozzles and holders
e. Caterpillar electronic diesel injection
f. Cummins electronic diesel injection
g. Detroit diesel electronic diesel injection
h. Hydraulic Electronic Unit Injector [HEUI] fuel system

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

a. Starting the reconditioned engine
b. Troubleshooting micro-computer controlled diesel engines
c. Micro-computer controlled diesel engine tune-up

V. ***METHODS OF INSTRUCTION:***

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

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

VI. ***TYPICAL ASSIGNMENTS:***

A. Connect fuel injection computer and access code
B. Adjust fuel injection pulse switch

VII. ***EVALUATION(S):***

A. Student progress is evaluated by:
   1. Successful completion of labor tasks 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:***

Safety Glasses

Content Review Form
PREREQUISITE COURSE

Target Course: DIESEL 027#3
MICRO-COMPUTER CONTROLLED DIESEL ENGINES LABORATORY

Prerequisite Course: DIESEL 024
HEAVY-EQUIPMENT DIESEL 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.	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.	constant volume combustion cycle from the constant pressure combustion cycle.	X
2..	Disassemble, inspect, and repair parts which are reusable in a manner consistent with accepted trade practices.		
3.	Assemble a diesel engine in accordance with manufacturer instructions and specifications. The student will identify and order new diesel engine parts as required.		X
4.	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.	X	X
5.	Learn engine tune-up procedures. The student will 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 X	
6.	Inspect and analyze the cause or failure of defective engine components in a manner consistent with accepted trade practices. The student will write a comprehensive failure analysis report about a failed engine component.	X	
7.	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		

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