San Bernardino Valley College
Curriculum Approved: September 13, 2004

I. COURSE INFORMATION:

Division: Transportation
Department: Diesel
Course ID: DIESEL 026
Course Title: Computer Controlled Diesel Engines
Units: 4
Lecture:3 Hours
Laboratory: 3 Hours
Prerequisite: DIESEL 024

Catalog Description: Theory and practical shop work in the repair, operation, and maintenance of Computer Controlled diesel engines. Includes general trouble-shooting and diagnostics using assorted electronic and computerized test equipment on operable computer controlled diesel engines.

Schedule Description: Theory and practical shop work in the repair, operation, and maintenance of Computer Controlled diesel engines.

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

III. EXPECTED OUTCOMES FOR STUDENTS:

Upon successful completion of this course, the student should 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. Describe the design, operation, and component parts of the computer controlled diesel engine fuel system.
D. Diagnose the fuel system using various electronic test equipment.
E. Perform routine servicing of the fuel system in a manner consistent with accepted industry standards
F. Explain the importance of a properly tuned engine.
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. Compare and contrast the hydraulic electronic unit injection system with the mechanical fuel injection system.
I. Outline the operation and function of data input, processing, and output systems of a computer controlled diesel engine.
J. Describe in detail the sequence and events of the four-stroke cycle diesel engine.

IV. CONTENT:

A. Introduction to computer controlled diesel engines
    1. General shop safety
    2. Tools and equipment
    3. Engine oil
    4. Diesel fuel
    5. Engine performance terminology
    6. Cycle of operation
    7. Combustion chamber types
    8. Basic engine components
B. Diesel engine components and service
    1. Cylinder head and valves
    2. Valve-train mechanism
    3. Engine brakes and hydraulic retarders
    4. Engine computer assembly
    5. Computer sensors
    6. Computer actuators
C. Diesel engine systems
    1. Air-intake systems
    2. Exhaust systems

3. computer
4. Sensor network
5. Output actuator network
6. Self-diagnosis/data systems

D. Diesel fuel-injection systems
1. Introduction to computer-controlled diesel fuel injection systems
2. Governors
3. Emission controls
4. Fuel-injection nozzles and holders
5. Caterpillar electronic diesel injection
6. Cummins electronic diesel injection
7. Detroit diesel electronic diesel injection
8. Hydraulic Electronic Unit Injector [HEUI] fuel system

E. Break-in, troubleshooting, and tune-up
1. Starting the reconditioned engine
2. Troubleshooting computer controlled diesel engines
3. computer controlled diesel engine tune-up

V. METHODS OF INSTRUCTION:

The methods of instruction include, but are not limited to:
A. Lecture and direct laboratory demonstration by instructor;
B. Guided laboratory practice by the learner and presentations demonstrations by field experts.

VI. TYPICAL ASSIGNMENTS:

A. Read assigned chapters from the textbook and answer all review questions that follow the chapter.
Typical Questions:
1. What is the purpose of the glow plugs?
2. Describe the design, operation, and component parts of the computer controlled diesel engine fuel system.

B. Typical Lab Assignment:
1. Connect fuel injection computer and access code
2. Adjust fuel injection pulse switch

VII. EVALUATION:

A. Student progress is evaluated by:
1. Oral and written tests;
2. Successful completion of labor tasks in accordance with manufacturers specifications;
3. Writing a comprehensive failure analysis report about a selected diesel engine component; and
4. A comprehensive written final exam.
Typical Questions:
a) Explain the importance of a properly tuned engine.
b) Describe the basic engine components.

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

VIII. TYPICAL TEXT(S):

Diesel Engine and Fuel system Repair Fifth Edition; John F. Dagel and Robert N Brady; Prentice Hall; 2002
Medium/Heavy Duty Truck Engine, Fuel & Computerized Management Systems; Sean Bennett; Thomson/Delmar; 2004

IX. OTHER SUPPLIES REQUIRED OF STUDENTS: Safety Glasses