AGM 245  Diesel Engine Fuel Systems & Diagnosis  3 Units

The study of common types of diesel fuel injection systems. Design and theory of operation of distributor type, in-line type, as well as electronically controlled systems. Testing and diagnostic procedures for various fuel systems is a major component of the course. Service and adjustments of injectors, nozzles, and governors will also be covered.

Field trips are required.  (A-F Only) Lecture /Lab  
Transfer: (CSU)

II. LEARNING CONTEXT

Given the following learning context, the student who satisfactorily completes this course should be able to achieve the goals specified in Section III, Desired Learning:

A. COURSE CONTENT

1. Required Content:

   a. Today's energy situation and energy needs
   b. Compression ignition and spark ignition engines
   c. Diesel engine parts
   d. Turbocharger parts
   e. Fuel injection process, physics, and engineering
   f. Physical and chemical reactions of fuels when burned
   g. Alternate fuel characteristics, heat energy, efficiency, and storage ability
   h. Methods of charging engine cylinders with air and removing the products of combustion
   i. Operation of each component in various types of diesel fuel injection systems
   j. Test, inspect, and adjust fuel injection systems parts
   k. Nozzle system maintenance, testing, and identification
   l. Troubleshoot, test, and repair turbocharger units
   m. Modify engines to operate on various alternate fuels
   n. Safe handling, storage, and fire control with flammable fuels

2. Required Lab Content:

   a. Identification of modern diesel fuel system components
b. Repair techniques of modern diesel fuel systems and components

c. Diagnosis of modern diesel fuel systems and components

d. Repair of common diesel fuel system and components

e. Adjustment of modern diesel fuel systems and components

B. HOURS AND UNITS

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<td>Lect</td>
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C. METHODS OF INSTRUCTION (TYPICAL)

Instructors of the course might conduct the course using the following method:

1. Related material will be presented through designated class lecture and lab demonstrations.

2. Assign additional studies from technical manuals specific to individual topics.

3. Assign instructional units in safety, problem-solving, and testing procedures for completion by the student to augment classroom lecture.

D. ASSIGNMENTS (TYPICAL)

1. **EVIDENCE OF APPROPRIATE WORKLOAD FOR COURSE UNITS**

   *Time spent on coursework in addition to hours of instruction (lecture hours)*

   a. Weekly reading assignments from required textbook.

   b. Periodic reading assignments from technical publications.

   c. Study for weekly quizzes.

   d. Study for midterm and final exams.

2. **EVIDENCE OF CRITICAL THINKING**

   *Assignments require the appropriate level of critical thinking*

   a. A customer has a refrigeration unit that is operated by a Kubota D722 engine. The customer complains that the engine is difficult to start and runs rough while under load.

      i. Describe the diagnostic procedure to determine the problem.

      ii. List three possible causes in order of probability.

      iii. Perform the necessary procedures and repairs.

      iv. Complete a "Shop Work Order" and turn in upon completion.

E. TEXTS AND OTHER READINGS (TYPICAL)

III. **DESIRED LEARNING**

A. **COURSE GOAL**  
As a result of satisfactory completion of this course, the student should be prepared to:

identify the common types of modern diesel fuel injection systems; identify the common components of modern diesel fuel injection systems; and diagnose and repair common problems in modern diesel fuel injection systems.

B. **STUDENT LEARNING GOALS**  
Mastery of the following learning goals will enable the student to achieve the overall course goal.

1. **Required Learning Goals**  
Upon satisfactory completion of this course, the student will be able to:

   a. Describe engine, engine fuels and fuel systems used on powered equipment.
   b. Recall basic diesel engine principles used on compression ignition engines.
   c. Analyze turbocharger design and related system maintenance.
   d. Describe basic differences between compression and spark ignition systems.
   e. Identify parts common to diesel fuel systems, turbochargers and governors.
   f. Analyze fuel system problems and failures.
   g. Disassemble, inspect, adjust, reassemble, and install fuel system parts.
   h. Demonstrate safe handling of engine fuels and operation techniques.

2. **Lab Learning Goals**  
Upon satisfactory completion of the lab portion of this course, the student will be able to:

   a. Diagnose and repair common diesel fuel injections system failures.
   b. Demonstrate proper diagnostic techniques commonly used on diesel engine fuel injection systems.
   c. Demonstrate proper safety procedures for diagnosing and repairing diesel engine fuel systems.

IV. **METHODS OF ASSESSMENT (TYPICAL)**

A. **FORMATIVE ASSESSMENT**

1. Lecture examination.
2. Laboratory write-up.
3. Problem-solving exercise.
4. Demonstration of appropriate safety techniques.
5. Midterm
B. SUMMATIVE ASSESSMENT

1. Course Final