# Diesel Fuel Systems

## Course Design

### 2006-2007

## Course Information

<table>
<thead>
<tr>
<th>Organization</th>
<th>Eastern Arizona College</th>
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<tr>
<td>Division</td>
<td>Industrial Technology Education</td>
</tr>
<tr>
<td>Course Number</td>
<td>AUT 113</td>
</tr>
<tr>
<td>Title</td>
<td>Diesel Fuel Systems</td>
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<tr>
<td>Credits</td>
<td>3</td>
</tr>
<tr>
<td>Developed by</td>
<td>Brian Coppola</td>
</tr>
<tr>
<td>Lecture/Lab Ratio</td>
<td>2 Lecture/3 Lab</td>
</tr>
<tr>
<td>Transfer Status</td>
<td>Non-transferable</td>
</tr>
<tr>
<td>Activity Course</td>
<td>No</td>
</tr>
<tr>
<td>CIP Code</td>
<td>47.0605</td>
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<tr>
<td>Assessment Mode</td>
<td>Pre/Post Test (25 Questions/100 Points)</td>
</tr>
<tr>
<td>Semester Taught</td>
<td>Fall</td>
</tr>
<tr>
<td>GE Category</td>
<td>None</td>
</tr>
<tr>
<td>Separate Lab</td>
<td>No</td>
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<tr>
<td>Awareness Course</td>
<td>No</td>
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<tr>
<td>Intensive Writing Course</td>
<td>No</td>
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### Prerequisites

None

### Educational Value

This course is designed to reinforce and apply information, processes, and ideas gained in other courses. The major intent of this course is to enhance the individual's abilities to work with and diagnosis of diesel equipment fuel systems.

### Description

Provides theory, diagnosis and service of hydro-mechanical and electronic diesel fuel systems. Includes an opportunity to analyze fuel system components, and system operational characteristics. The course shall place emphasis on testing and service procedures of Caterpillar's mechanical & computer controlled fuel systems. This class prepares students for the ASE Certification test related to heavy duty diesel fuel systems.
**Textbooks**

**Supplies**
safety glasses, steel toe shoes, and shop clothes (cotton)

**Competencies and Performance Standards**

1. **Apply proper safety procedures and processes.**
   
   **Learning objectives**
   
   *What you will learn as you master the competency:*
   
   a. Acquaint self with shop environment and hazards.
   b. Acquaint self with emergency procedures and policy.
   c. Accept responsibility for personal well being and practice and follow safety guidelines.
   d. Acquaint self with material safety data sheets and chemical used in shop.

   **Performance Standards**
   
   *Competence will be demonstrated:*
   
   o when learner completes safety assignments and written exam at a satisfactory level.

   **Criteria - Performance will be satisfactory when:**
   
   o learner observes and practices safety procedures.

2. **Diagnose general engine drivability concerns using a strategy-based process.**

   **Learning objectives**
   
   *What you will learn as you master the competency:*
   
   a. Determine root cause of poor engine performance related to mechanical fuel system components.
   b. Interpret diagnostic information related to exhaust, odor & color and suggest needed action.

   **Performance Standards**
   
   *Competence will be demonstrated:*
   
   o when learner completes aligned assignment and job sheets listed in the related learning plan. (The assignment and job sheets must be completed at a satisfactory level to the instructor).
   
   o when the learner performs the priority tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level).

   **Criteria - Performance will be satisfactory when:**
   
   o learner is productive, works safely, and in a professional manner while working on task requirements listed in related learning plan.
   
   o learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on the task requirements listed in related learning plan.
3. **Acquire knowledge about diesel fuel types and of the fuel and air reaction during the combustion process.**

   **Learning objectives**
   
   *What you will learn as you master the competency:*
   
   a. Acquaint self with diesel fuel properties and various grades.
   b. Demonstrate an understanding of the byproducts of the combustion process and their relationship to stoichiometry.

   **Performance Standards**
   
   *You will demonstrate your competence:*
   
   o when learner completes aligned assignment and job sheets listed in the related learning plan. (The assignment and job sheets must be completed at a satisfactory level to the instructor).
   o when the learner performs the priority tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level).

   *Your performance will be successful when:*
   
   o learner is productive, works safely, and in a professional manner while working on task requirements listed in related learning plan.
   o learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on the task requirements listed in related learning plan.
   o learner actively participates in the task requirements listed in the related learning plan.
   o learner attends required class and lab sessions and shows up on time.

4. **Demonstrate an understanding of hydro-mechanical and electronic diesel fuel system types, function of various components, and operation of fuel subsystems.**

   **Learning objectives**
   
   *What you will learn as you master the competency:*
   
   a. Identify diesel fuel system components and locations.
   b. Demonstrate an understanding of each fuel system (mechanical & electrical) components and their operational characteristics.
   c. Identify the various fuel subsystem components and their locations.
   d. Perform manufacture specific diagnostic procedures and service subsystem per manufacture recommendations.

   **Performance Standards**
   
   *You will demonstrate your competence:*
   
   o when learner completes aligned assignment and job sheets listed in the related learning plan. (The assignment and job sheets must be completed at a satisfactory level to the instructor).
when the learner performs the priority tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level).

Your performance will be successful when:
- learner is productive, works safely, and in a professional manner while working on task requirements listed in related learning plan.
- learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on the task requirements listed in related learning plan.
- learner actively participates in the task requirements listed in the related learning plan.
- learner attends required class and lab sessions and shows up on time.

5. Diagnose drivability concerns related to diesel equipment fuel, air induction and exhaust systems on non-computerized and computerized engine control systems.

Learning objectives
What you will learn as you master the competency:
- a. Determine causes of hard fault conditions related to computerized engine controls and make needed repair.
- b. Determine causes of intermittent drivability concerns (no code) and make needed repair.

Performance Standards
Competence will be demonstrated:
- when learner completes aligned assignment and job sheets listed in the related learning plan. (The assignment and job sheets must be completed at a satisfactory level to the instructor).
- when the learner performs the priority tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level).

Criteria - Performance will be satisfactory when:
- learner is productive, works safely, and in a professional manner while working on task requirements listed in related learning plan.
- learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on the task requirements listed in related learning plan.
- learner actively participates in the task requirements listed in the related learning plan.
- learner attends required class and lab sessions and shows up on time.

6. Perform diesel fuel system component replacement, fuel system set-up, and preventative maintenance service procedures.

Learning objectives
What you will learn as you master the competency:
- a. Practice removing and reinstallation of serviceable fuel system components.
- b. Perform various injection timing set-up and verification procedures per manufacture requirements.
c. Perform manufacture recommended routine inspection (PM service), verification and adjustment procedures as required to keep the fuel system operating as designed.
d. Perform diesel engine governor operational checks and service as needed.
e. Perform diesel engine retarder (engine brake systems) operational checks and adjust as needed.

**Performance Standards**

_You will demonstrate your competence:_

- when learner completes aligned assignment and job sheets listed in the related learning plan. (The assignment and job sheets must be completed at a satisfactory level to the instructor).
- when the learner performs the priority tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level).

_Your performance will be successful when:_

- learner is productive, works safely, and in a professional manner while working on task requirements listed in related learning plan.
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- learner attends required class and lab sessions and shows up on time.

**Types of Instruction**

Classroom Presentation
Lab
Simulated or Actual Work Experience
Computer-Based Instruction
Group Activities/cooperative learning

**Grading Information**

**Grading Rationale**

Grading Weights
Lab=45%
Class (Includes Test and Assignments)=45%
Final Exam (Post Test is the final)=10%

Note: The Pre / Post test has a total of 25 questions which are worth "4" points each. Total possible on the AUT 113 Pre / Post test is 100 points.

Grading Methods

Class score calculation-
Quizzes, assignments and job sheet points shall be added and carry a weight equal to one test score. All exam except the final shall have equal weight (test scores averaged) and used in class score calculations. The final (post test) will be worth at least 10% of the overall final grade calculation.

Lab score calculation-
Instructor should evaluate each student's work habits using lab time card. Each student should be evaluated on productivity and progress on task requirements, working in a professional manner, clean-up and safe work habits. Instructor is also required to evaluate each student's skill level in achieving the task requirements outlined in the various learning plans.

Instructors are encouraged to reward students for showing up on time and attending each class and lab session. This can be done by requiring students to make arrangements with the instructor to make-up any lost time prior to missed day. All students need to notify the instructor of sick days through voice mail, etc. on the day of sickness. Instructors should not allow for any work to be turned in late or any test made up without some type of deduction for late assignments/test. Suggested deduction 50% of original score.

**Grading Scale**

- A 90-100%
- B 80-89.9%
- C 70-79.9%
- D 60-69.9%
- F 00-59.9%

Pass/Fail A non-major student may choose to have a grade of P or F rather than a letter grade. A grade of P will require that the student receive a percentage grade of at least 68%. A grade less than this will result in a grade of F.