Diesel Electrical Systems Design and Diagnosis
Course Design
2006-2007

Course Information
Organization: Eastern Arizona College
Division: Industrial Technology Education
Course Number: AUT 109
Title: Diesel Electrical Systems Design and Diagnosis
Credits: 3
Developed by: Brian Coppola
Lecture/Lab Ratio: 2 Lecture/3 Lab
Transfer Status: Non-transferable
Activity Course: No
CIP Code: 47.0605
Assessment Mode: Pre/Post Test (25 Questions/100 Points)
Semester Taught: Fall
GE Category: None
Separate Lab: No
Awareness Course: No
Intensive Writing Course: No

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 the diesel electrical systems.

Goals
The goal of this course is to prepare the individual to diagnose and service diesel starting, charging, and accessory electrical systems and components.
**Description**

Provides a study of diesel starting, charging, and accessory electrical systems and components. An emphasis is placed on electrical system diagnosis and electrical repair. Includes using various industry standard diagnostic electrical equipment and testing techniques. Prepares the student to take the ASE certification test on Electrical/Electronic Systems.

**Textbooks**


**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:*
   
   • learner observes and practices safety procedures.

2. **Demonstrate an understanding of electrical fundamentals and concepts**

   **Learning objectives**
   
   *What you will learn as you master the competency:*
   
   a. Describe electrical voltage, current, induction, and resistance characteristics.
   b. Describe basic circuit design and operation characteristics.
   c. Identify various electrical components and their operational purpose within various electrical systems.

   **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.

- 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.

3. **Diagnose and repair various electrical/electronic vehicle system concerns using a strategy-based process.**

   **Learning objectives**

   *What you will learn as you master the competency:*

   a. Perform trouble-shooting process on electrical components and systems using industry standard tooling, equipment and reference information.

   **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.

4. **Diagnose and repair various diesel starting system concerns using a strategy-based process.**

   **Learning objectives**

   *What you will learn as you master the competency:*

   a. Determine root cause of various vehicle starting (cranking) related problems.
   b. Perform starter bench inspection and testing processes.

   **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:**
5. **Diagnose and repair various diesel charging system concerns using a strategy-based process.**

*Learning objectives*

*What you will learn as you master the competency:*

a. Determine root cause of various vehicles charging system problems-on car.

b. Perform alternator bench inspection and testing processes.

*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. **Diagnose and repair electrical accessory and safety system (lights, horn, windshield wipers, alarm, and shut down systems) using manufacture recommended techniques.**

*Learning objectives*

*What you will learn as you master the competency:*

a. Determine reason for the electrical component and system malfunction and repair per manufacturer’s requirement.

b. Perform proper lighting, horn, wipers, alarm, shut down, and safety electrical system service and repair processes.

*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).

- 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.
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.

7. **Perform industry standard electrical repairs on various diesel electrical systems.**

**Learning objectives**

*What you will learn as you master the competency:*

a. Perform proper electrical wire and connector 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 NATEF 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.

**Types of Instruction**

Classroom Presentation

Lab

Individualized/Independent Study

Simulated or Actual Work Experience
**Grading Information**

**Grading Rationale**

Grading Weights

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

Grading Methods

Class score calculation-
Quizzes, assignments and job sheet points shall be added and carry a weight equal to one test score.
All exams 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 NATEF task requirement 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  0-59.9%

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.