

CATALOG INFORMATION

Dept and Nbr: DET 189

Title: HEAVY DUTY ELECTRICAL

Full Title: Heavy Duty Equipment Electrical Systems

Last Reviewed: 1/22/2018

| Units   |      | Course Hours per Week |      | Nbr of Weeks | Course Hours Total |       |
|---------|------|-----------------------|------|--------------|--------------------|-------|
| Maximum | 3.00 | Lecture Scheduled     | 2.25 | 17.5         | Lecture Scheduled  | 39.38 |
| Minimum | 3.00 | Lab Scheduled         | 2.25 | 8            | Lab Scheduled      | 39.38 |
|         |      | Contact DHR           | 0    |              | Contact DHR        | 0     |
|         |      | Contact Total         | 4.50 |              | Contact Total      | 78.75 |
|         |      | Non-contact DHR       | 0    |              | Non-contact DHR    | 0     |

Total Out of Class Hours: 78.75

Total Student Learning Hours: 157.50

Title 5 Category: AA Degree Applicable

Grading: Grade Only

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly: DET 89

**Catalog Description:**  
Principles of operation of electrical and electronic components and systems used in medium/heavy duty trucks, public transportation, construction and agricultural equipment. Introduction to electronic control systems.

**Prerequisites/Corequisites:**

**Recommended Preparation:**  
Eligibility for ENGL 100 or ESL 100 and Course Completion of DET 179

**Limits on Enrollment:**

**Schedule of Classes Information:**  
Description: Principles of operation of electrical and electronic components and systems used in medium/heavy duty trucks, public transportation, construction and agricultural equipment. Introduction to electronic control systems. (Grade Only)  
Prerequisites/Corequisites:  
Recommended: Eligibility for ENGL 100 or ESL 100 and Course Completion of DET 179  
Limits on Enrollment:

Transfer Credit:

Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

|                      |                      |            |           |
|----------------------|----------------------|------------|-----------|
| <b>AS Degree:</b>    | <b>Area</b>          | Effective: | Inactive: |
| <b>CSU GE:</b>       | <b>Transfer Area</b> | Effective: | Inactive: |
| <b>IGETC:</b>        | <b>Transfer Area</b> | Effective: | Inactive: |
| <b>CSU Transfer:</b> |                      | Effective: | Inactive: |
| <b>UC Transfer:</b>  |                      | Effective: | Inactive: |

**CID:**

**Certificate/Major Applicable:**

Both Certificate and Major Applicable

## **COURSE CONTENT**

### **Student Learning Outcomes:**

At the conclusion of this course, the student should be able to:

1. Diagnose and repair starting, charging and chassis electrical systems.
2. Use computer based daignostic scan tools with on on-board diagnostic systems.
3. Inteprete service manuals and schematics for electrical systems.

### **Objectives:**

At the conclusion of this course, the student should be able to:

1. Explain the fundamentals of alternating current (AC), direct current (DC), series and parallel circuits.
2. Read and interpret schematic diagrams.
3. Evaluate electrical circuits from schematic diagrams.
4. Properly use diagnostic tools related to the analysis and repair of electrical systems.
5. Identify, locate, and analyze electronic components and microprocessors.
6. Test, diagnose, and repair electrical and electronic circuits and components.
7. Discuss and apply personal, shop, and environmental safety procedures.

### **Topics and Scope:**

#### **I. Review**

- A. Laws and theory
- B. Diagnostic tools
- C. Direct current
- D. Alternating current

#### **II. Symbols and Diagrams**

- A. Electrical symbols
- B. Use of schematic diagrams

#### **III. Series and Parallel Circuits**

- A. Series circuits
- B. Parallel circuits

- C. Series-parallel circuit
- IV. Testing and Repair of Components
  - A. Battery testing
  - B. Starters
  - C. Alternators/generators
  - D. Lighting circuits
  - E. Switches and relays
  - F. Harnesses and ECM's
- V. Electronic Components and Microprocessors
  - A. Sensors/switches
  - B. Electronic control modules
  - C. Actuators
  - D. Diagnosis with scanner
- VI. On-Board Networks and Diagnostics
- VII. Testing, Diagnosis, and Repair
  - A. Using test equipment
  - B. Diagnostic procedures and manuals
  - C. Repair of electronic circuitry
- VIII. Safety
  - A. Personal
  - B. Shop
  - C. Environmental

All topics are covered in both the lecture and lab parts of the course.

### **Assignment:**

#### **Lecture-Related Assignments:**

1. Reading 25 - 50 pages a week
2. Ten to fifteen tests to include final exams

#### **Lab-Related Assignments:**

1. Evaluate batteries and starting systems, complete task sheets
2. Test and analyze charging systems, complete task sheets
3. Inspect and test starters and alternators
4. Test electronic control systems with computer diagnostic tools
5. Complete NATEF (National Automotive Technicians Education Foundation) recommended task sheets
6. Daily work logs (work assigned, work completed)

### **Methods of Evaluation/Basis of Grade:**

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

|                 |
|-----------------|
| Daily work logs |
|-----------------|

|                    |
|--------------------|
| Writing<br>0 - 25% |
|--------------------|

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Task sheets

Problem solving  
10 - 25%

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Starter and alternator inspections, test electronic controls

Skill Demonstrations  
10 - 25%

**Exams:** All forms of formal testing, other than skill performance exams.

Tests to include final

Exams  
40 - 50%

**Other:** Includes any assessment tools that do not logically fit into the above categories.

None

Other Category  
0 - 0%

**Representative Textbooks and Materials:**

Fundamentals of Mobile Heavy Equipment. Wright, Gus and Duffy, Owen and Heard, Scott. Jones and Bartlett. 2019

Fundamentals of Medium/Heavy Duty Commercial Vehicle Systems. Duffy, Owen and Wright, Gus. Jones and Bartlett. 2016

Instructor prepared materials