

**SAN DIEGO COMMUNITY COLLEGE DISTRICT  
MIRAMAR COLLEGE  
ASSOCIATE DEGREE COURSE OUTLINE**

**SECTION I****SUBJECT AREA AND COURSE NUMBER:** Diesel Technology 137**COURSE TITLE:** Diesel Fuel Injection Systems**Units: 2**  
Grade Only**CATALOG COURSE DESCRIPTION:**

Students learn the basic skills necessary to understand and service diesel fuel injection systems. They learn which industry-based procedures are used to disassemble, assemble, and test fuel pumps, nozzles, and injectors. Students also learn how industry-based standards are used for maintaining, repairing, and adjusting fuel pumps, governors, and injectors on live diesel engines.

**REQUISITES:**

**Corequisite: Completion of or concurrent enrollment in:**  
DIES 100 with a grade of "C" or better, or equivalent

**FIELD TRIP REQUIREMENTS:** May be required**TRANSFER APPLICABILITY:** Associate Degree Credit & transfer to CSU and/or private colleges and universities**TOTAL LECTURE HOURS:** 16 - 18**TOTAL LAB HOURS:** 48 - 54**STUDENT LEARNING OBJECTIVES:**

Upon successful completion of the course the student will be able to:

1. Identify, explain, and compare the function, principles, and operation of Caterpillar, Cummins, and Detroit Diesel fuel injection systems
2. Demonstrate how to perform maintenance tasks on Caterpillar, Cummins, and Detroit Diesel fuel injection systems
3. Appraise the need for and perform repair operations on Caterpillar, Cummins, and Detroit Diesel fuel injection systems
4. Demonstrate how to perform fuel system adjustments on Caterpillar, Cummins, and Detroit Diesel operational engines.

**SECTION II****1. COURSE OUTLINE AND SCOPE:****A. Outline Of Topics:**

The following topics are included in the framework of the course but are not intended as limits on content. The order of presentation and relative emphasis will vary with each instructor.

- I. The function, principles, and operation of Caterpillar, Cummins, and Detroit Diesel fuel injection systems
  - A. Diesel engine combustion principles
  - B. Fuel injection fundamentals and objectives
  - C. Governor fundamentals and objectives
  - D. Helical groove metering principle
  - E. Caterpillar fuel injection systems
  - F. Cummins fuel injection systems
  - G. Detroit Diesel fuel injection systems.
- II. Caterpillar, Cummins, and Detroit Diesel fuel injection system maintenance and repair
  - A. Maintaining and repairing Caterpillar nozzles and injectors
  - B. Maintaining and repairing Caterpillar fuel pumps
  - C. Maintaining and repairing Cummins injectors
  - D. Maintaining and repairing Cummins fuel pumps
  - E. Maintaining and repairing Detroit Diesel injectors.
- III. Caterpillar, Cummins, and Detroit Diesel fuel injection system adjustments
  - A. Caterpillar operational engine adjustments
  - B. Cummins operational engine adjustments
  - C. Detroit Diesel operational engine adjustments.

**B. Writing Assignments:**

Writing assignments are required and may include, but are not limited to, the following:

- I. 1. Preparing a shop notebook
- II. 2. Writing a diesel fuel injection system report
- III. 3. Responding to short essay questions about related topics such as the function, principles, operation, maintenance, and/or repair of Caterpillar, Cummins, and Detroit Diesel fuel injection systems.

**C. Reading Assignments:**

Reading assignments are required and may include but, are not limited to, the following:

- I. 1. Chapters from course textbook(s) and supplementary texts such as service manuals and technical support materials for the components being used in class (e.g., the Detroit Diesel Series V92 and V71 service manuals)
- II. 2. Reading diesel fuel injection system-related articles in professional journals such as Service Tech, Diesel Progress, and Caterpillar Engine News.
- III. 3. Reading reports, on-line articles, and laboratory guides associated with diesel technology.

**D. Appropriate Assignments that Demonstrate Critical Thinking:**

Critical thinking assignments are required and may include, but are not limited to, the following:

- I. 1. Analyzing methods learned in class and utilizing appropriate methods for completing laboratory tasks
- II. 2. Evaluating and recording the condition of Caterpillar, Cummins, and/or Detroit Diesel fuel systems
- III. 3. Formulating repair plans for malfunctioning Caterpillar, Cummins, and/or Detroit Diesel fuel systems
- IV. 4. Calculating and solving mathematical problems.

**E. Appropriate Outside Assignments:**

Outside assignments may include, but are not limited to, the following:

- I. 1. Conducting research
- II. 2. Completing all reading and writing assignments including a shop notebook and a diesel fuel injection system report
- III. 3. Completing field assignments/projects.

**2. METHODS OF EVALUATION:**

A student's grade will be based on multiple measures of performance unless the course requires no grade. Multiple measures may include, but are not limited to, the following:

I. Performing manipulative skills as needed to complete laboratory assignments satisfactorily  
Successfully applying theory to laboratory assignments  
Performing on written, oral, and/or practical examinations  
Performing on out-of-class assignments including shop notebook and diesel fuel injection system report  
Contributing to class discussion.

### **3. METHODS OF INSTRUCTION:**

Methods of instruction may include, but are not limited to, the following:

- \* Lecture
- \* Lecture Discussion
- \* Computer Assisted Instruction
- \* Laboratory
- \* Discussion Seminar
- \* Lecture-Lab Combination
- \* Learning Modules
- \* Audio-Visual
- \* Collaborative Learning
- \* Other (Specify)
- \* Field trips and/or field assignments

### **4. REQUIRED TEXTS AND SUPPLIES:**

Textbooks may include, but are not limited to:

#### **TEXTBOOKS:**

1. Brady, Robert N.. Heavy-Duty Truck Fuel Systems, 1 ed. Prentice Hall, 1996, ISBN: 0133856755
2. Dagle, John F., and Robert N. Brady.. Diesel Engine and Fuel System Repair, 5th ed. Prentice-Hall, 2002, ISBN: 0130929816

#### **MANUALS:**

#### **PERIODICALS:**

#### **SOFTWARE:**

#### **SUPPLIES:**

1. Appropriate clothing and footwear for shop work
2. Safety glasses
3. Shop notebook (8 1/2" x 11" spiral bound)
4. Calculator

**ORIGINATOR:** James Cargill

**CO-CONTRIBUTOR(S)**

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