

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

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

This course concentrates on the electronically controlled fuel injection systems of Caterpillar, Cummins, and Detroit Diesel engines. Students perform independently while learning system design, analysis, and mechanical adjustments. Students learn how to use electronic service tools to access and set programmable system features and electronic diagnostic tools to troubleshoot system malfunctions.

REQUISITES:**Prerequisite:**

DIES 137 with a grade of "C" or better, or equivalent
&
DIES 144 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. Explain how the electronically controlled fuel injection systems of Caterpillar, Cummins, and Detroit Diesel engines function and operate
2. Demonstrate maintenance tasks on the electronically controlled fuel injection systems of Caterpillar, Cummins, and Detroit Diesel engines
3. Perform maintenance tasks independently
4. Identify, evaluate, and repair malfunctions on electronically controlled Caterpillar, Cummins, and Detroit Diesel fuel injection systems
5. Select and demonstrate appropriate operations to access and set programable features on electronically controlled Caterpillar, Cummins, and Detroit Diesel fuel injection systems.

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. Electronic fuel system design and operation
 - A. Caterpillar
 - B. Cummins
 - C. Detroit Diesel.
- II. Mechanical and electronic diesel fuel system differences
 - A. Caterpillar
 - B. Cummins
 - C. Detroit Diesel.
- III. Advantages of electronic fuel systems
 - A. Caterpillar
 - B. Cummins
 - C. Detroit Diesel.
- IV. Electronic control modules
 - A. Caterpillar
 - B. Cummins
 - C. Detroit Diesel.
- V. ECM serial data/sensor communications
 - A. Caterpillar
 - B. Cummins
 - C. Detroit Diesel.
- VI. Electronic unit injectors
 - A. Caterpillar
 - B. Cummins
 - C. Detroit Diesel.
- VII. Independent problem solving
 - A. Industry publications
 - B. Local industry technical assistance
 - C. On-line industry reference materials
 - D. On-line industry technical assistance.
- VIII. Maintenance procedures
 - A. Caterpillar
 - B. Cummins
 - C. Detroit Diesel.
- IX. Repair operations
 - A. Caterpillar
 - B. Cummins
 - C. Detroit Diesel.
- X. Troubleshooting options
 - A. Caterpillar
 - B. Cummins
 - C. Detroit Diesel.
- XI. Diagnostic tooling
 - A. Caterpillar
 - B. Cummins
 - C. Detroit Diesel.
- XII. Programable system features
 - A. Caterpillar
 - B. Cummins
 - C. Detroit Diesel.
- XIII. Electronic service tools
 - A. Caterpillar
 - B. Cummins
 - C. Detroit Diesel.

B. Reading Assignments:

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

- I. 1. Chapters from course textbooks
- II. 2. Assigned sections of service manuals and technical support materials for the components being used in the class, such as the Detroit Diesel Series V92 and V71 service manuals
- III. 3. Diesel technology-related articles available on-line and in professional journals such as Service Tech, Diesel Progress, Caterpillar Engine News, Maintenance Manager, and Heavy Duty Trucking
- IV. 4. Supplementary texts such as diesel technology books, reports, and laboratory guides.

C. Appropriate Assignments that Demonstrate Critical Thinking:

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

- I. 1. Selecting appropriate materials and employing appropriate methods to complete laboratory tasks, such as fixing an engine performance problem related to electronic fuel controls by using wiring diagrams, fault codes, and electronic diagnostic tools
- II. 2. Calculating and solving mathematical problems
- III. 3. Formulating repair plans for electronically controlled Caterpillar, Cummins, and Detroit Diesel fuel injection systems.

D. Appropriate Outside Assignments:

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

- I. 1. Researching appropriate methods for identifying, evaluating, and repairing malfunctions on electronically controlled Caterpillar, Cummins, and Detroit Diesel fuel injection systems
- II. 2. Preparing research reports and other writing assignments
- III. 3. Completing reading assignments from course textbook(s), service manuals, on-line sources, professional journals, etc.
- IV. 4. Completing field assignments and projects.

E. Writing Assignments:

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

- I. 1. Reports on the operation, maintenance, and repair of electronically controlled Caterpillar, Cummins, or Detroit Diesel fuel systems
- II. 2. Written responses to critical inquiries about operating, maintaining, and repairing electronically controlled Caterpillar, Cummins, or Detroit Diesel fuel systems
- III. 3. Expository essays about a subject related to the course.

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 satisfactorily complete laboratory assignments
- Applying theory to laboratory assignments
- Performing on written, oral, or practical examinations
- Performing on out-of-class assignments including writing assignments and field projects
- Contributing to class discussions.

3. METHODS OF INSTRUCTION:

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

- * Lecture
- * Laboratory
- * Lecture-Lab Combination
- * Other (Specify)
- * 1. Demonstration
- * 2. Field trips or field assignments

4. REQUIRED TEXTS AND SUPPLIES:

Textbooks may include, but are not limited to:

TEXTBOOKS:

1. Dagele, John F., and Robert N. Brady.. Diesel Engine and Fuel System Repair, 5th ed. Prentice-Hall, 2002, ISBN: 0130929816
2. Petruzella, Glen.. Automotive Electronic Fundamentals, 1st ed. Glencoe, 1995, ISBN: 0028199308

MANUALS:

PERIODICALS:

SOFTWARE:

SUPPLIES:

1. Appropriate clothing and footwear for shop work
2. Safety glasses
3. Calculator
4. Scantron answer sheets

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CO-CONTRIBUTOR(S)

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