

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

SECTION I

SUBJECT AREA AND COURSE NUMBER: Diesel Technology 131

COURSE TITLE:

Alternative-Fueled Engine Overhaul

Units:

4

Grade Only

CATALOG COURSE DESCRIPTION:

This course covers the fundamental skills necessary to perform major overhaul operations on alternative-fueled engines. Topics include theory of operation; construction and application; and the use of repair shop tools and equipment associated with large bore alternative-fueled engines. This course is designed for students who have prior experience in the diesel industry.

REQUISITES:

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

Advisory:

ENGL 042 with a grade of "C" or better, or equivalent or Assessment Skill Level R4
&
ENGL 043 with a grade of "C" or better, or equivalent or Assessment Skill Level W4
and
MATH 038 with a grade of "C" or better, or equivalent or Assessment Skill Level M30

FIELD TRIP REQUIREMENTS:

May be required

TRANSFER APPLICABILITY:

Associate Degree Credit & transfer to CSU

CID:

TOTAL LECTURE HOURS:

48 - 54

TOTAL LAB HOURS:

48 - 54

STUDENT LEARNING OBJECTIVES:

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

1. Describe the alternative-fueled engine's theory of operation.
2. Describe the alternative-fueled engine's construction and application.
3. Differentiate among the major operating systems of alternative-fueled engines.

4. Operate common diesel repair shop and engine-specific tools and equipment.
5. Prepare written progress and repair records and compose engine evaluation reports.
6. Disassemble and assemble an alternative-fueled engine.
7. Assess serviceability of major and minor engine components.
8. Prepare an engine for performance testing.
9. Evaluate the performance of an engine during a test run.

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. Alternative-fueled engine theory of operation
 - A. Combustion theory
 - B. Operating principles
- II. Construction and operation of electronically controlled alternative-fueled engines
 - A. Major engine parts/components and their relationships
 - B. Service applications
- III. Major operating systems of alternative-fueled engines
 - A. Fuel
 - B. Lubrication
 - C. Cooling
 - D. Air inlet
 - E. Exhaust
- IV. Common diesel repair shop and engine-specific tools and equipment
 - A. Partial engine disassembly and assembly (crankshaft not removed)
 - B. Performance preparation adjustments
 - C. Performance testing
- V. Engine documentation
 - A. Shop notebook
 - B. Engine performance report
 - C. Progress and repair records
 - D. Engine evaluation report
- VI. Serviceability
 - A. Major components
 - B. Minor components
- VII. Performance testing
 - A. Engine tune-up
 - B. Pressurization of cooling and lubrication systems
 - C. Installation of exhaust system
 - D. Installation of safety devices
- VIII. Engine test run procedures
 - A. Pre-test preparation
 - B. Test and run-in
 - C. Test reports

B. Reading Assignments:

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

- I. Chapters from course textbook(s).
- II. Articles related to alternative-fueled engine repair in professional journals such as Service Tech, Diesel Progress, Commercial Carrier Journal (CCJ), Utility Fleet, Fleet Owner, or Transportation Equipment News.
- III. Reports, repair manuals, online resources, or laboratory guides associated with alternative-fueled engine technology.

C. Writing Assignments:

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

- I. Shop notebook/ lab task-sheet.
- II. Engine performance report.
- III. Responses to short essay questions about related topics such as the operation, assembly/disassembly, and/or repair of alternative-fueled engines.

D. Appropriate Outside Assignments:

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

- I. Conducting research relating to engine updates of alternative-fueled engines at equipment manufacturers' websites.
- II. Completing all reading and writing assignments, including a shop notebook and an engine performance report on an alternative-fueled engine.
- III. Completing a field assignment report on a site visit to a local alternative-fueled engine repair shop.

E. Appropriate Assignments that Demonstrate Critical Thinking:

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

- I. Analyzing methods learned in class and utilizing appropriate methods for completing laboratory tasks.
- II. Evaluating and recording the condition of major alternative-fueled engine components.
- III. Formulating repair plans for alternative-fueled engine components.
- IV. Calculating and solving mathematical problems such as oil clearance, cylinder taper, cylinder out-of-round, and liner protrusion.

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. Manipulative skills as needed to complete laboratory assignments satisfactorily.
- II. Application of theory to laboratory assignments.
- III. Written, oral, and/or practical examinations.
- IV. Out-of-class assignments including alternative-fueled engine reports and projects.
- V. Class discussion.
- VI. Attendance per current department policy.

3. METHODS OF INSTRUCTION:

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

- * Lecture-Lab Combination
- * Computer Assisted Instruction
- * Lecture Discussion
- * Audio-Visual
- * Other (Specify)
 - * A. Demonstration.
 - * B. Field trips or field assignments.
 - * C. Laboratory assignments utilizing specifically planned instructional activities.

4. REQUIRED TEXTS AND SUPPLIES:

Textbooks may include, but are not limited to:

TEXTBOOKS:

1. Bennett, Sean. Medium/Heavy Duty Truck Engines, Computerized Management Systems, 5th ed. Delmar-Cengage Learning, 2017, ISBN: 9781305578555

MANUALS:

PERIODICALS:

SOFTWARE:

SUPPLIES:

1. Safety glasses; OSHA approved with clear lenses.
2. Appropriate clothing and footwear for shop work
3. Hearing protection; ear muffs or ear plugs
4. Work gloves; leather, mechanics, or nitrile gloves
5. Blue ink pen, #2 pencil, and spiral bound notebook
6. Calculator
7. Scantron answer sheets
8. 1 GB or larger USB memory stick

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PROPOSAL ORIGINATOR: Daniel Willkie

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