BUTTE COLLEGE
COURSE OUTLINE

I. **CATALOG DESCRIPTION**

AET 38 - Diesel Engines and Machine Systems **4 Unit(s)**

Prerequisite(s): NONE
Recommended Prep: Reading Level IV; English Level III; Math Level II
Transfer Status: CSU
51 hours Lecture
51 hours Lab

This course presents the theory, operating principles, application, component parts, support systems, maintenance, adjustment, and repair of Diesel engines and related systems used on modern trucks and heavy equipment used in the construction and agricultural industries. The related systems include electrical, power train, hydraulic, and Heating, Ventilating, and Air Conditioning (HVAC) systems.

II. **OBJECTIVES**

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

A. Explain the operating principles of Diesel engines and related systems.
B. Measure engine components and evaluate serviceability.
C. Identify components used in engine and related systems.
D. Identify the knowledge and skills required to repair and maintain electrical, hydraulic, engine, and power train components.
E. Differentiate between open circuits, short circuits and shorts to ground in electrical circuit systems.
F. Construct and analyze electrical circuits from schematic diagrams.
G. Communicate and work cooperatively with others.

III. **COURSE CONTENT**

A. **Unit Titles/Suggested Time Schedule**

Lecture

Topics	Hours
1. Introduction to Engines, Machine Systems, and Safety	6.00
2. Electrical Systems	6.00
3. Engine Operating Principles	6.00
4. Harvest Field Trip	3.00
5. Basic Engine Components	3.00
6. Engine Subsystems (Cooling, Lubrication)	3.00
7. Intake and Exhaust, Forced Induction Systems	3.00
8. Fuel Injection Systems - Fundamentals	3.00
9. Fuel Injection Systems - Nozzles, Governors	3.00
10. Power Trains	6.00
11. Other Components (HVAC, Tires)	3.00
12. Other Components (Belts, Chains)	3.00
13. Preventive Maintenance and Diagnosis	3.00
Total Hours	51.00

Lab

Topics	Hours
1. Introduction to Engines, Machine Systems, and Safety	3.00
2. Electrical Systems	6.00
3. Engine Operating Principles	6.00
4. Harvest Field Trip	6.00
5. Basic Engine Components	3.00
6. Engine Subsystems (Cooling, Lubrication)	3.00
7. Intake and Exhaust, Forced Induction Systems	3.00
8. Fuel Injection Systems - Fundamentals	3.00
9. Fuel Injection Systems - Nozzles, Governors	3.00
10. Power Trains	6.00
11. Other Components (HVAC, Tires)	3.00
12. Other Components (Belts, Chains)	3.00
13. Preventive Maintenance and Diagnosis	3.00
Total Hours	51.00

IV. **METHODS OF INSTRUCTION**

A. Lecture
B. Collaborative Group Work
C. Field Trips
D. Homework: Students are required to complete two hours of outside-of-class homework for each hour of lecture
E. Discussion
F. Demonstrations
G. Reading Assignments
H. Multimedia Presentations

V. **METHODS OF EVALUATION**

A. Quizzes
B. Portfolios
C. Homework
D. Class participation
E. Lab Projects
F. Written Assignments
G. Mid-term and final examinations
H. Essays and research papers
I. Laboratory evaluation will include problem solving exercises or skill demonstrations.

VI. **EXAMPLES OF ASSIGNMENTS**

A. Reading Assignments
    1. Read the text chapter on shop safety. Prepare for class discussion on what we will need to do to maintain a safe shop environment.
    2. Read the Electrical Notes provided on your class BlackBoard page. Be prepared to discuss circuit types, rules, and Ohm's Law.
B. Writing Assignments

1. Complete your daily Lab Report to review the topic presented and evaluate your understanding of it at the end of each class. Return the white copy to the instructor- keep the pink copy for your reference.
2. In a 2 page paper describe how all the engine components work together to produce power. Include the effect of forced induction.

C. Out-of-Class Assignments

1. Answer the ASE questions at the end of each assigned chapter in the text. These will be kept in your portfolio to be checked by the instructor.
2. Using internet sources provided investigate the operating principles of power train and other components. Prepare a single page summation of the purpose, operation, and component parts of a differential and submit to instructor.

VII. RECOMMENDED MATERIALS OF INSTRUCTION

Textbooks:

A. Norman, A., Corinchock, J. Diesel Technology: Fundamentals, Service, Repair. 7th Edition. Goodheart-Willcox Company, Inc., 2007.

Materials Other Than Textbooks:

A. AET 38 References (second half semester)
B. References for AET 38 Power Trains and Other Components

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Date: 11/03/2014