San Bernardino Valley College
Curriculum Approved: 10/15/2013
Board Approval: 11/14/2013
Unique course Identification Number: CCC000550289
TOP Code: 0947.00 - Diesel Mechanics Technolo

3.48

I. CATALOG DESCRIPTION:

A. Department Information:

Division: Applied Technology, Transportation & Culinary Arts
Department: Diesel
Course ID: DIESEL064
Course Title: Auto/Truck Electrical Systems

Units: 4

Lecture: 3 contact hour(s) per week
                     48 - 54 contact hours per semester

Laboratory: 3 contact hour(s) per week
                     48 - 54 contact hours per semester

Prerequisite: None

B. Catalog Description:

This course covers basic electrical theory, use of meters, test equipment, wiring diagrams, diagnosis and repair/replacement of major electrical components of automobiles and trucks. Emphasis is placed on diagnosis of starting systems, charging systems, and electrical circuits such as lights and batteries. This course is also offered as AUTO 064. (Formerly DIESEL 019)

C. Schedule Description:

This course covers basic electrical theory, use of meters, test equipment, wiring diagrams, diagnosis and repair/replacement of major electrical components of automobiles and trucks. This course is also offered as AUTO 064. (Formerly DIESEL 019)

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1

III. COURSE OBJECTIVES FOR STUDENTS:
Upon successful completion of the course the student should be able to:

A. Identify safety requirements and recognize safety signs and symbols
B. Demonstrate a working knowledge of basic electrical concepts including, but not limited to Ohm's Law, resistance, voltage, and current
C. Interpret basic units and principles of electricity, magnetism and their interrelationship and application
D. Diagnose and repair malfunctions in electrical systems and components

E. Describe battery purpose, battery operation, and capacity

F. Identify and explain starting systems principles

G. Explain function and operation of charging systems

IV. COURSE CONTENT:

LECTURE

A. Shop safety
   1. General shop safety
   2. Hazardous materials
   3. Material Safety Data Sheets (MSDS)
   4. Machinery hazards

B. Basic electricity, Direct Current (DC) and Alternating Current (AC) circuits
   1. Electrical fundamentals
   2. Conductors and insulators
   3. Characteristics of electricity (current, voltage, resistance)

C. Introduction and use of Digital Multi-Meter (DMM)
   1. Electrical circuits
   2. Ohm's Law
   3. Series and parallel circuits
   4. Circuit protection and circuit faults

D. Electromagnetic devices, electrical and magnetic components
   1. Magnetism and electromagnetism
   2. Electromagnetic load devices
   3. Magnetic induction

E. General electrical diagnosis
   1. Reading electrical schematics and wiring diagrams
   2. Diagnostic strategies
   3. Test equipment and special tools
   4. Horn and wiper diagnosis and repair

F. Battery diagnosis and service
   1. Battery operation
   2. Battery service
   3. Battery diagnosis

G. Charging system diagnosis and service
   1. Charging system operation
   2. Charging system services
   3. Charging system diagnosis

H. Starting system
   1. Starting system operation
   2. Starting system service
   3. Starting system diagnosis

LABORATORY

A. Shop Safety
   1. Complete mechanical safety program
   2. Complete hazardous waste safety program

B. Introduction and use of digital multi-meter
   1. Complete a work order with concern, cause and correction
   2. Identify and interpret electrical/electronic system concern
   3. Identify hybrid vehicle high voltage circuits and service plug locations and safety precautions
   4. Diagnose the electrical/electronic integrity of electrical circuits using Ohm's law
   5. Measure voltage in an electrical circuit
   6. Measure current in an electrical circuit
   7. Check continuity and measure resistance in an electrical circuit
   8. Check electrical circuits using a test light
   9. Check electrical circuits using fused jumper wires
  10. Locate opens, shorts, and grounds in an electrical circuit
  11. Measure and diagnose the cause of key-off battery drain (parasitic draw)
  12. Test and service fuses, fusible links, and circuit breakers
  13. Test and service switches, connectors, relays, solid-state devices, and wires of electrical/electronic circuits
  14. Tin the soldering iron and solder wire splices
  15. Repair terminals, wiring, and wiring harnesses

C. Battery diagnosis
   1. Measure the battery's state-of-charge
   2. Perform a load test
   3. Perform a quick charge test
   4. Inspect, clean, fill and replace a battery
   5. Identify electronic memory functions affected by battery disconnect and maintain or restore the functions
   6. Charge a battery
   7. Jump-start a vehicle
   8. Identify hybrid vehicle auxiliary (12v) battery service, repair and test procedures

D. Starter system diagnosis and service
   1. Inspect the starting system and perform a current draw test
   2. Perform starter circuit voltage drop tests
   3. Test the starter control circuit components
   4. Remove and install a starter
   5. Bench test a starter
   6. Disassemble, test, and reassemble a starter

E. Charging system diagnosis and service
   1. Perform preliminary inspection and test of the charging system
   2. Diagnose the charging system for undercharge, no-charge or overcharge conditions
   3. Perform a charging system output test
   4. Perform an alternator full-field test
   5. Perform a voltage regulator cutout test
   6. Perform circuit resistance and voltage drop tests

7. Test the charging system using an oscilloscope
8. Determine the current requirements for a charging system
9. Remove and install the alternator
10. Disassemble, inspect, and reassemble the alternator
11. Remove, inspect, and install the voltage regulator

V. METHODS OF INSTRUCTION (May include any, but do not require all, of the following):

A. Lecture
B. Class and/or small group discussion
C. Use of films, videotapes, or other media
D. Use of written materials: texts, journals, etc.
E. Classroom demonstrations
F. Guided practice
G. Laboratory
H. Computer assisted instruction

VI. TYPICAL OUT-OF-CLASS ASSIGNMENTS:

A. Reading assignments are required and may include (but are not limited to) the following:

Read the chapter on the types of circuit protection devices in the textbook and be prepared to discuss in small groups at the next class meeting.

B. Critical thinking assignments are required and may include (but are not limited to) the following:

Inspect and service fusible links, circuit breakers, and fuses in electrical circuits by researching applicable vehicle service information.

C. Writing assignments are required and may include (but are not limited to) the following:

In a one-page paper, describe the three circuit arrangements that manufacturers use to wire the voltage regulator to the alternator's rotor circuit.

VII. METHODS OF EVALUATION

A. Class participation
B. Examinations
C. Homework
D. Lab work
E. Written papers or reports
F. Quizzes
G. Cumulative finals or certifications

VIII. TYPICAL TEXT(S):

A. Duffy, James. <u>Auto Electricity and Electronics Online Course</u>. 3rd ed. Goodheart-Willcox, 2010.

B. Halderman, James D. and Kershaw, John F. <u>Automotive Electrical and Electronic Systems</u>. 5th ed. Prentice Hall, 2010.

C. Hollenbeak, Barry. <u>Automotive Electricity and Electronics</u>. 3rd ed. Thomas, Delmar Learning , 2011.

IX. OTHER SUPPLIES REQUIRED OF STUDENTS:

A. Safety glasses

B. Protective clothing

C. Ear plugs

DEPARTMENT: Diesel

COURSE NUMBER: DIESEL 064

COURSE TITLE: Auto/Truck Electrical Systems

WORKSHEET

Course Objectives	Outcome	Activity	Assessment
This course demonstrates a working knowledge of basic electrical components including, but not limited to, Ohm's Law, resistance, voltage and current.	Students will demonstrate their understanding of basic electrical, how to read electrical diagrams, and diagnostic of electrical circuits.	Students will demonstrate strategy base diagnostic procedures in the repair of electrical circuits.	Monitoring the students' procedure to diagnose electrical faults. The use of proper tools to diagnose those faults will demonstrate how well the students analyze wiring diagrams to determine the source of the problem.
Students will communicate, verbally and in written form, the causes and corrections of typical electrical system failures.	Students will demonstrate their ability to apply critical thinking and written skills in the diagnose and repair malfunctions in electrical systems and components.	Students will diagnose and make needed repair and adjustment to the electrical systems and components. Students will document the complaint, the cause and the correction of the repair.	Students will complete all related lab assignments and tasks sheets related to disassembly, inspection of parts, adjustments, and services of the electrical systems and components.

SLO #1   Students will demonstrate their understanding of basic electrical, how to read electrical diagrams, and diagnostic of electrical circuits.

SLO #2   Students will demonstrate their ability to apply critical thinking and written skills in the diagnose and repair malfunctions in electrical systems and components.

San Bernardino Valley College
Curriculum Approved: 11/04/2013
Board Approval: 12/12/2013
Unique course Identification Number:
TOP Code: 0000.00 -

I. CATALOG DESCRIPTION:

    A. Department Information:

        Division: Mathematics, Business & Computer Technology

        Department: Mathematics

        Course ID: MATH151

        Course Title: Precalculus

        Units: 4

        Lecture: 4 contact hour(s) per week
                    64 - 72 contact hours per semester

        Prerequisite:
           MATH 102 and MATH 103 or eligibility for MATH 151 as determined through the
        SBVC assessment process

    B. Catalog Description:
        This course provides foundational skills to facilitate success in calculus. Topics include
        polynomials and rational functions, exponential and logarithmic functions, systems of nonlinear
        equations and inequalities, parametric and polar equations, trigonometric functions, and limits.

    C. Schedule Description:

        This course provides foundational skills to facilitate success in calculus. Topics include
        polynomials and rational functions, exponential and logarithmic functions, systems of nonlinear
        equations and inequalities, parametric and polar equations, trigonometric functions, and limits.

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1

III. COURSE OBJECTIVES FOR STUDENTS:
Upon successful completion of the course the student should be able to:

    A. Describe, analyze, compare, and contrast the characteristics of polynomial functions

    B. Graph polynomial, rational, exponential, and logarithmic functions with transformations

    C. Recognize techniques for evaluating limits

    D. Solve systems of linear and nonlinear equations and inequalities

    E. Plot polar coordinates and graph polar equations

    F. Solve and graph inverse trigonometric functions

    G. Solve parametric equations

   H. Calculate and find the zeros of higher order polynomials
   I. Recognize the relationship between functions and their inverses graphically and algebraically
   J. Apply functions to model real world applications
   K. Identify special triangles and their related angle and side measures

IV. COURSE CONTENT:

A. Review of linear, radical, and absolute value functions
1. Definitions
2. Evaluation
3. Domain and range
4. Graphs
5. Alegrba of functions
6. Inverse functions
7. Applications

B. Polynomial and rational functions
1. Linear and quadratic functions
2. Theory of polynomials
3. Graphs of rational functions
4. Higher order polynomials
5. Synthetic division
6. Applications

C. Exponential and logarithmic functions
1. Graphs of exponential and logarithmic functions
2. Properties of exponential and logarithmic functions
3. Applications

D. Systems of nonlinear equations and inequalities
1. Analytical and graphical solutions
2. Partial fraction decomposition
3. Linear programming
4. Applications

E. Limits
1. Introduction to limits
2. Techniques for evaluating limitis
3. The tangent line problem

F. Trigonometric functions
1. Unit circle and right triangle trigonometry
2. Functions and graphs
3. Inverse trigonometric functions

G. Trigonometric identities
1. Trigonometric identities
2. Solving trigonometric equations

H. Analytic geometry

1. Parametric equations
2. Polar coordinates
3. Graphs of polar equations

V. METHODS OF INSTRUCTION (May include any, but do not require all, of the following):
A. Lecture
B. Distributed education
C. Class and/or small group discussion
D. Use of written materials: texts, journals, etc.
E. Classroom demonstrations
F. Instructor generated handouts
G. Whiteboard drill and practice

VI. TYPICAL OUT-OF-CLASS ASSIGNMENTS:
A. Reading assignments are required and may include (but are not limited to) the following:

Read the section introducing limits. Be prepared to discuss in your own words what a limit is and what it means for a function or sequence to have a limit.

B. Critical thinking assignments are required and may include (but are not limited to) the following:

Consider the equation $2 \sin x - 1 = 0$. Be prepared to explain the similarities and differences between finding all solutions in the interval $[0, ?/2)$, finding all the solutions in the interval $[0, 2?)$, and finding the general solution.

C. Writing assignments are required and may include (but are not limited to) the following:

Write two or three sentences stating the general guidelines that you follow when solving (a) exponential functions and (b) logarithmic functions. Submit your guidelines to your instructor.

VII. METHODS OF EVALUATION
A. Class participation
B. Examinations
C. Homework
D. Quizzes
E. Cumulative finals or certifications
F. Worksheets

VIII. TYPICAL TEXT(S):

    A. Larson, R. <u>Precalculus with Limits</u>. 2nd ed. Brooks Cole, 2010.

    B. Stewart, J., Redlin, L., and Watson, S. <u>Precalculus</u>. 6th ed. Cengage Learning, 2011.

    C. Sullivan, M. <u>Precalculus</u>. 9th ed. Addison Wesley, 2011.

IX. OTHER SUPPLIES REQUIRED OF STUDENTS:

    A. TI-83 Plus graphing calculator or comparable model

STUDENT LEARNER OUTCOMES
MATH 151: PRECALCULUS

Math 151: Precalculus

1. Students will demonstrate their ability to solve real world problems employing systems of linear equations by making application of operations with matrices and their ability to translate English phrases into mathematical models to formulate and solve representative systems.

2. Students will demonstrate their ability to construct the graphs of algebraic and transcendental functions by correctly applying concepts of rigid and non-rigid transformations (i.e., horizontal and vertical translations, reflections, stretches, and compressions) to the basic graphs of polynomial, rational, exponential, and logarithmic functions.