San Bernardino Valley College
Curriculum Approved: FA01

I. CATALOG DESCRIPTION:

A. Department Information:

Division: Technical and Workforce Development
Department: Electricity/Electronics
Course ID: ELECTR 110
Course Title: Direct Current Circuit Analysis
Lecture: 3 hours
Units: 3
Corequisite: ELECTR 111

Course Description:
A comprehensive course in direct current circuit analysis including Ohm's Law, series and parallel circuit analysis, voltage and current dividers, DC meters, Kirchhoff's Laws, magnetic circuits, and network theorems.

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A comprehensive course in direct current circuit analysis including Ohm's Law, series and parallel circuit analysis, voltage and current dividers, DC meters, Kirchhoff's Laws, magnetic circuits, and network theorems.

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

III. EXPECTED OUTCOMES FOR STUDENTS:

Upon completion of this course, students will be able to:

A. Define and describe the basic concepts of matter, energy sources, and electrical current flow.
B. Describe the operation of resistors in series, parallel, and series/parallel direct current circuits.
C. Recognize common symbols and define terminology used in the field of electronics.
D. Formulate proper procedures for unit conversion, scientific notation, and metric conversion.
E. Set up calculator procedures to solve addition, subtraction, division, multiplication, fractions, powers (exponents) and radicals (roots), and percentage problems.
F. Solve Ohm's Law and the power formulas to series, parallel, and series/parallel circuits.
G. Examine calculator procedures to solve resistive bridge circuits.
H. Deduce the Thevenin equivalent circuit, Superposition, or Millman's theorems to solve single source or two source circuit problems.
I. Select algebraic problem solving procedures using Kirchhoff's voltage and current laws.
J. Apply calculator procedures for solving voltage divider and maximum power transfer problems.
K. Define and describe magnetism, electromagnetism, electromagnetic induction, and use the common symbols and terminology.

IV. CONTENT:

A. Basic Concepts of Electricity
   1. Definition, physical and chemical states of matter
   2. Composition of matter
   3 Structure of the atom
   4. Concept of the electron theory
   5. Lons
   6. Energies that change electrical balance

7. Conductors, semiconductors, and insulators
8. Sample of an electrical system
9. Basic principles of static electricity
10. Electrical potential
11. Charges in motion
12. Three important electrical quantities
13. Basic electrical circuits

B. Electrical Quantities and Components
1. Basic electrical units and abbreviations
2. Using the metric system to help
3. Conductors and their characteristics
4. Resistors
5. Resistor color code
6. Measuring voltage, current, and resistance with meters
7. Diagrams used for electrical shorthand

C. Ohm's Law
1. Ohm's Law and relationships between electrical quantities
2. Three common arrangements for the Ohm's Law equation
3. Sample application of metric prefixes and powers of 10
4. Direction of current flow
5. Polarity and voltage
6. Comparison of circuit current directions from DC and AC sources
7. Work, energy, and power
8. Measuring electrical energy consumption
9. Commonly used versions of Ohm's Law and power formulas

D. Series Circuits
1. Definition and characteristics of a series circuit
2. Resistance in series circuits
3. Voltage in series circuits
4. Kirchhoff's voltage law
5. Power in series circuits
6. Effects of opens in series circuits and troubleshooting hints
7. Effects of shorts in series circuits and troubleshooting hints
8. Designing a series circuit to specifications
9. Special applications
10. Introduction to troubleshooting skills

E. Parallel Circuits
1. Definition and characteristics of a parallel circuit
2. Resistance in parallel circuits
3. Voltage in parallel circuits
4. Kirchhoff's current law
5. Power in parallel circuits
6. Methods to calculate equivalent resistance
7. Effects of opens in parallel circuits and troubleshooting hints
8. Effects of shorts in parallel circuits and troubleshooting hints
9. Designing a parallel circuit to specifications
10. Similarities and differences between series and parallel circuits
11. Sources in parallel
12. Current dividers

F. Series-Parallel Circuits
   1. What is a series-parallel circuit?
   2. Approaches to recognize and analyze series and parallel circuit portions
   3. Total resistance in series-parallel circuits
   4. Current in series-parallel circuits
   5. Voltage in series-parallel circuits
   6. Power in series-parallel circuits
   7. Effects of opens in series-parallel circuits and troubleshooting hints
   8. Effects of shorts in series-parallel circuits and troubleshooting hints
   9. Designing a series-parallel circuit to specifications

G. Basic Network Theorems
   1. Some important terms
   2. Maximum power transfer theorem
   3. Superposition theorem
   4. Thevenin's theorem
   5. Norton's theorem
   6. Converting Norton and Thevenin equivalent parameters
   7. Loaded voltage dividers
   8. Wheatstone bridge circuit

H. Magnetism and Electro-Magnetism
   1. Background information
   2. Fundamental laws, rules, and terms to describe magnetism
   3. Elemental electromagnetism
   4. Some practical applications of magnetism
   5. Important metric units, terms, symbols, and formulas
   6. Practical considerations about core materials
   7. The B-H curve
   8. The hysteresis loop
   9. Induction and related effects
   10. Faraday's law
   11. Lenz's law and reciprocal effects of motors and generators

V. METHODS OF INSTRUCTION:

Methods of instruction will vary from instructor to instructor but may include:

A. Lectures and discussions about direct current characteristics and fundamentals to include: units of measure, ohms law and power formulas, resistor types and color codes, series, parallel, and series-parallel circuit analysis, and magnetism.
B. Lectures and discussion are complemented with handouts and instruction on different methods of analysis and trouble shooting.
C. Dynamics are accented with the use of graphs, film-strips and videos.
D. Homework is assigned to promote know how, expertise, vocabulary and writing skills.

VI. TYPICAL ASSIGNMENTS:

Typical assignments will vary from instructor to instructor but may include:

A. Use a calculator to solve Ohm's law and power consumption problems.
B. Complete a variational analysis of a series, parallel, or series-parallel circuit.
C. Describe the principles of electricity.

VII. EVALUATION:

A. Methods of evaluation will vary from instructor to instructor but may include:

1. Quizzes
2. End-of-chapter tests
3. Final exam

Typical Question: Express 4,600,000 in scientific notation.

B. Frequency of evaluation will vary from instructor to instructor but may include:

1. Periodic feedback based on chapter quizzes
2. Eight (8) chapter exams
3. One (1) comprehensive final exam

VIII. TYPICAL TEXT:

Meade, R. L., Foundations of Electronics, 3rd Edition, ITP Delmar, New York, 1998
Gates, E. D., Introduction to Electronics, 4th Edition, ITP Delmar, New York, 2001
Harsany, S. C., Introduction to Electronics, Prentice Hall, New Jersey, 2000

IX. OTHER SUPPLIES REQUIRED OF STUDENTS:

Scientific calculator.

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Step 3, Form B

Content Review Form
COREQUISITE (OR PREREQUISITE/COREQUISITE) COURSE

Target Course: ELECTR 110 - Direct Current Circuit Analysis

Corequisite or Prerequisite/Corequisite Course: ELECTR 111 - Direct Current Circuits Laboratory

Instructions:

1. List exit competencies (skills) from the Corequisite Course. These skills are listed in the "Student Outcomes" section of the Course Outline.
2. Indicate which of the listed exit competencies (skills) are necessary concurrent enrollment skills that should be developed in conjunction with completion of the target course. Mark with an "X" each needed skill.
3. Indicate the degree of importance of each identified concurrent enrollment skill related to the target course, using the following rating scale:
   1 = Critical 2 = Very Helpful 3 = Desirable

Skills Analysis

Concurrent Enrollment Skills in Corequisite Course	Concurrent Skills Needed for Success in Target Course (Mark with an X if needed.)	Degree of Importance (Rate 1 – 3)
1. Demonstrate the correct function and operation of the Analog Multimeter, Digital Multimeter, DC Power Supply, and applicable circuitry.	X	1
2. Build Direct Current circuits and describe the operation of the circuit.	X	1
3. Apply critical thinking and problem solving to troubleshoot Direct Current circuits.	X	2
4. Demonstrate the ability to write clear and concise laboratory reports.	X	2
5. Identify the common electronic components by physical description.	X	1
6. Determine resistor ohmic values and power dissipation ratings of selected resistors.	X	2
7. Identify common electronic schematic symbols.	X	1