METROPOLITAN STATE UNIVERSITY OF DENVER
Office of Academic and Student Affairs

REGULAR COURSE SYLLABUS

College of: Professional Studies

Department: Engineering and Engineering Technology

Prefix & Course Number: CPE 1140 **Crosslisted With*:** ____

Course Title: DC Circuit Fundamentals

Transcript Course Title (30 characters): DC Circuit Fundamentals

Check All That Apply: Required for Major: X Required for Minor: Specified Elective: _____

Required for Concentration: _____ Elective: ___ Service Course:

To receive Title IV financial aid funds, all institutions of higher education must comply with the federal definition of a credit hour. The Higher Learning Commission requires institutions to maintain policies and procedures for verifying compliance with this definition.

> ***Federal Credit Hour Definition:*** *A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than:*
> *(1) one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or ten to twelve weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time; or (2) at least an equivalent amount of work as required in paragraph (1) of this definition for other activities as established by an institution, including laboratory work, internships, practica, studio work, and other academic work leading toward to the award of credit hours. 34CFR 600.2 (11/1/2010)*

Credit Hours: 4 (3+2) **Schedule Type**: B **Grade Mode**: L

Face-to-Face or Equivalent Hours per course:

Lecture 45 Lab 30 Internship _____ Practicum _____ Other (please specify type and hours):_____

Additional Student Work Hours per course: 120

Variable topics umbrella course: No X **Yes** _____ If yes, number of credits/repeats allowed _____

Specified repeatable course: No X **Yes** _____ If yes, number of credits/repeats allowed _____

Prerequisite(s): An intermediate algebra course or one and one-half years of secondary school algebra or equivalent and appropriate score on the mathematics pre-assessment placement test or higher level math course

(with a grade of "C" or better for all prerequisites)

Corequisite(s): _____

Prerequisite(s) or Corequisite(s): _____

Banner Enforced Coding:

Prerequisite(s): ACT Math 25 or SAT Mathematics 570 or Accuplacer Elementary Algebra 100 or Accuplacer Elem Alg. transfer 100, or MTH 1110, or MTH 1120, or MTH 1400 or MTH 1410, or MTH 2410 (with a grade of "C" or better for all prerequisites)

Corequisite(s): _____

Prerequisite(s) or Corequisite(s): _____

Registration restrictions: Level _____ **Class** _____**Program/Major** _____ **Student attribute** _____

Catalog Course Description:
This course covers DC circuit analysis, including mesh analysis, nodal analysis, Thevenin conversion, Norton conversion, power, magnetism and magnetic circuits, capacitance, and inductance. An introduction to electrical laboratory procedures and the measurement of basic circuit parameters is also included.

Specific Variable Topics Course Description (if applicable, umbrella course description included above):

Required Reading and Other Materials will be equivalent to:

Robbins. (2006). *Circuit Analysis, 4th Edition or latest edition*. Thompson Delmar Learning

Specific, *Measurable* Student Behavioral Learning Objectives:
Upon completion of this course the student should be able to:

1. Utilize Ohm's law, Kirchhoff's Voltage Law Voltage and Current Laws, Superposition, Thevenin and Norton conversions to analyze DC circuits
2. Determine the theoretical value for current, voltage, power and resistance in DC series, parallel and series parallel circuits utilizing calculators and computer simulation programs
3. Work with a team to construct circuits and validate theoretical findings utilizing analog and digital meters, power supplies, breadboards and electrical components
4. Write laboratory finding in a concise document comparing theoretical and actual data with computer generated models

Detailed Outline of Course Content or Outline of Field Experience/Internship (experience, responsibilities and supervision):

I. Units and Notation:
- A. SI System
- B. Scientific Notation
- C. Review of Inequalities
- D. Approximations

II. Nature of Electricity:
- A. Structure of Matter
- B. Electric Properties of Matter:
  - 1. Conductors
  - 2. Insulators
  - 3. Semiconductors
- C. Current
- D. EMF and Voltage
- E. Resistance
- F. Conventional Current
- G. DC and AC

III. Familiarization:
- A. Voltmeter
- B. Ammeter
- C. Ohmmeters
- D. Digital Multimeters

IV. Fundamental Relations:
- A. Ohm's Law
- B. Measuring Voltage, Current and Resistance
- C. Work, Energy and Power
- D. Resistors:
  - 1. Types
  - 2. Ratings
  - 3. Color Code
- E. Conductance
- F. Efficiency
- G. Sources:
  - 1. Ideal
  - 2. Real
- H. Linearity

V. Series and Parallel Circuits:
- A. Electric Circuits
- B. Series Circuits
- C. Kirchhoff's Voltage Law
- D. Open Circuits
- E. Voltage Divider Principle
- F. Parallel Circuits

G. Kirchhoff's Current Law
H. Current Divider Principle
I. Short Circuits

VI. Series-Parallel Circuits

VII. Network Transformation:
A. Balanced Bridges
B. Voltage-Current Source Transformation
C. Solving Simultaneous Equations
1. Cramer's Rule
2. Matrix Method
D. Mesh Analysis
E. Nodal Analysis

VIII. Network Theorems:
A. Superposition
B. Thevenin
C. N0l10n
D. Maximum Power Transfer

IX. Intro to Fields and Electrical Physics:
A. Coulomb's Law
B. Electric Fields
C. Breakdown
D. Resistance of Conductors:
1. Basics
2. AWG
E. Resistance of Semiconductors
F. Temperature Dependence

X. Familiarization with Oscilloscope:
A. Time Axis
B. Scope Used as a Voltmeter

XI. Capacitance:
A. Nature of Capacitance
B. Dimensions and Dielectrics
C. Types and Ratings
D. Series and Parallel
E. RC Networks
F. Energy Storage

XII. Magnetic Fields and Currents:
A. Magnetic Fields
B. Flux Density and Field Intensity
C. Permeability
D. Reluctance

E. B-H Curves and Hysteresis
F. Magnetic Circuits

XIII. Inductance:
A. Electromagnetic Induction
B. Self-inductance
C. Inductors
D. RL Circuits
E. Energy Stored

XIV. Soldering, Splicing, Crimping

Evaluation of Student Performance:

1. Examinations
2. Written Assignments
3. Lab Reports
4. Laboratory Exam