Wayne County Community College District

COURSE SYLLABUS

EE 101 Circuit Analysis I

CREDIT HOURS: 4.00

CONTACT HOURS: 90.00

COURSE DESCRIPTION:
The fundamentals of direct current (DC) as applied to all aspects of the electrical/ electronic field. Direct current electron flow theory, OHMS's law, series and parallel and compound circuits, network theorems, capacitors, magnetic circuits, inductors, American Wire Gauge, and different type of cables will be covered. The course also includes introduction to sinusoidal waveforms and ac circuits. Students experimentally verify the fundamental discussed in the course by constructing and testing circuits. Instruments such as multimeters, power supplies, signal generators, and oscilloscope are used.

COEREQUISITE: *EE 107*

EXPECTED COMPETENCIES:
Upon successful completion of this course, the student will:
1) Understand algebra to solve DC circuit.
- a) Determine the systems units.
  - i) Become familiar with basic physics definitions such as mass, force, speed, acceleration, atom, and charges.
  - ii) Be able to solve first degree, second degree equations.
- b) Understand algebra to solve electrical circuits.
  - i) Become familiar with the metric to American systems conversion and vice versa for length, area, volume, mass and linear and angular speed.
  - ii) Be able to solve linear systems using substitution and elimination methods as well as determinant and matrix methods.

2) Understand electrical measurement units and their relationship with each other.
a) Explain the differences between current, voltage and resistance.
- b) State the definition of current in terms of charge flow.
- c) Define the positive direction of current flow in terms of charge polarity and direction.
- d) Determine current from a specified charge flow and vice versa.
- e) State the laws, which relate voltage to energy per unit charge and use it given appropriate data to find the various quantities.
- f) Describe the various fixed and variable DC power supplies.

3) Understand resistance and AWG and applications.
a) List different types of resistive materials and how resistors are used in electronics.
b) Identify resistor values from color code or other marks and list composition and reasons for different usages.
c) Describe the resistance in electrical circuitry, color-coding, wire size and calculate the resistance of wires.
d) Determine the resistance of a conductor as function of temperature and nonlinear resistors.
e) Be able to use American Wire Gauge table to specify the wire size for wiring.

4) Understand series and parallel DC circuits.

a) State Ohm's law and its applications.
b) State Kirchoff"s voltage and current laws and apply them in voltage and current divider circuits.
c) Define the effect of open and short circuits and their impact on the circuit.
d) State Serious-Parallel networks, ladder networks, potentiometer loading and their applications.
e) Solve any series, parallel and series parallel circuit to calculate current, voltage resistance and power.

5) Understand DC methods of analysis and theorems.
a) State superposition principle and its application.
b) State source conversion, brand current and mesh analysis.
c) State the nodal and mesh analysis to solve circuits.
d) Be able to use Y to Delta and Delta to Y conversion in circuit analysis.
e) Be able to use the Thevinin's and Norton's theorems in solving circuits.

6) Understand capacitor and inductor and their applications.
a) Show the different purposes for capacitors and list common types and construction
b) Identify capacitor types; list common usages; methods of varying capacitance and explain the terms *charge* and *coulomb*.
c) Describe the electric field, capacitance and capacitors in electrical circuits.
d) Describe the magnetic field, inductance, and inductor in electrical circuits.
e) Explain how inductance relates to magnetism and describe coil construction, cores and usage.
f) Indentify inductor types and reasons for various core materials; how diameter and wire affects the values.
g) List ten uses for magnetism in electronics technology.

7) Understand basic construction and operation of electrical/electronic instrumentation equipment.
a) Explain meter construction and components.
b) Identify meter protection, safety and usage
c) Explain care of equipment and test leads.

8) Understand basic theory and operation of DC machines.
a) Describe the theory and operation of DC generators.
b) Describe the theory and operations of DC motors.
c) Describe the operation of transformer with DC inputs.

9) Understand electrical safety.
a) Explain how multiple output supplies are able to supply more than one voltage.
b) Explain where fuses and circuit breakers are commonly and electrically located in circuits; approximate sizes for common circuits; house service box common fuses and circuit breaker configuration and precautions for replacement.
c) Explain the effects of proper and improper termination.
d) Explain the purposes of grounding and common conventions used in electrical and electronic work.

ASSESSMENT METHODS:
Student performance may be assessed by examination, quizzes, case studies, oral conversation, group discussion, oral presentations. The instructor reserves the option to employ one or more of these assessment methods during the course.

GRADING SCALE:
90%-100% = A
80%-89.9%= B

70%-79.9%= C
60%-69.9%= D
<60% = E