HOSTOS COMMUNITY COLLEGE

DEPARTMENT OF MATHEMATICS

ENGR 20400:	ELECTRICAL CIRCUITS
CREDIT HOURS:	3.0
EQUATED HOURS:	3.0
CLASS HOURS:	3.0
PREREQUISITE:	General Physics I (PHY 210)
COREQUISITE:	Calculus III (MAT 310)
REQUIRED TEXTS:	Charles K. Alexander: Fundamentals of Electric Circuits. 5th Edition. McGraw Hill. ISBN: 0073380571
DESCRIPTION:	This is an introductory course to electrical circuit analysis. Topics include: circuit elements, their voltage-current relations, basic laws of circuit analysis, methods of circuit analysis, circuit theorems, operational amplifiers, capacitors and inductor, sinusoids, phasors and sinusoidal steady state analysis.
LEARNING OUTCOMES:	Students should be able to identify and analyze electrical circuits by applying the theorems and methodologies that are introduced in this course.

Students are expected:

- To understand the physical principles from which the basic laws for circuit analysis are derived.
- To identify series and parallel networks and their implications for the analysis of circuits.

- To demonstrate the understanding of circuit analysis by identifying and applying the most suitable methodology for a given circuit.
- To use operational amplifiers to perform mathematical operations with signals.
- To understand the representation of signals and circuit elements in both domains, time domain and frequency domain.
- To perform analysis on RLC circuits with sinusoidal inputs in the frequency domain.

GENERAL EDUCATION CORE COMPETENCIES: The practice of electrical circuits analysis promotes the development and practice of the Hostos General Education Core Competencies. Students are expected to increase their awareness on when and how general education competencies are fundamental to the professional practice of engineering. (Please refer to the Hostos General Education Core Competencies for their full description)

EXAMINATIONS: A minimum of two term exams and a comprehensive final examination.

GRADES: A, A^-,B^+, B, B^-, C^+, C, D, I, F

COURSE OUTLINE

ENGR 20400 - ELECTRICAL CIRCUITS

1. BASIC CONCEPTS AND BASIC CIRCUIT LAWS (Ch. 1,2) (4 sessions)
    - System of Units.
    - The Unit of Charge, Current, Voltage and Power
    - Passive Sign Convention
    - Passive and Active Circuit Elements
    - Ohm's Law
    - Kirchhoff's Laws
    - Series and Parallel Resistors
    - Current and Voltage Division
    - Wye-Delta Transformations

2. METHODS OF ANALYSIS (Ch. 3) (4 sessions)
    - Nodal Analysis,
    - Mesh Analysis

3. CIRCUIT THEOREMS (Ch. 4) (4 sessions)
    - Superposition,
    - Source Transformation
    - Thevenin's Theorem
    - Norton's Theorem
    - Maximum Power Transfer

TERM EXAM #1 (1 session)

4. OPERATIONAL AMPLIFIERS (Ch. 5) (3 sessions)
    - Operational Amplifiers
    - Ideal Operational Amplifiers
    - Operational Amplifiers Circuits (inverting, noninverting, summing, difference)

- Cascaded Operational Amplifier Circuits

5. CAPACITORS AND INDUCTORS (Ch.6) (3 sessions)
    - Series and Parallel Capacitors and Inductors
    - Applications: Integrator and Differentiator

6. SINUSOIDS AND PHASORS (Ch.9) (3 sessions)
    - Sinusoids
    - Phasors
    - Phasor Relationships for Circuit Elements
    - Impedance (series, parallel)
    - Wye-Delta Transformations
    - Kirchhoff's Laws in the Frequency Domain

7. SINUSOIDAL STEADY-STATE ANALYSIS (Ch. 10) (2sessions)
    - Nodal Analysis,
    - Mesh Analysis

TERM EXAM #2 (1 session)

- Superposition Theorem (3 sessions)
- Source Transformation Theorem
- Thevenin's Theorem
- Norton's Theorem
- Operational Amplifier AC Circuits

FINAL EXAMINATION