C A M O S U N C O L L E G E

D E P A R T M E N T O F E L E C T R O N I C S

ECET 250E LINEAR CIRCUITS 1

OFFERED: Fall semester
CREDIT: 4
WORKLOAD: 4H Lecture, 2.5H Lab
PREREQUISITES: Restricted to students taking the Engineering Bridge Program

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OBJECTIVE

To introduce basic electronic circuit theory, linear circuit analysis techniques and to expose students to laboratory hands on exercises.

OUTLINE:

INTRODUCTION and OBJECTIVE of the course

Electronic system model. Linear vs non linear systems. Lab equipment
Charge and current, voltage, energy, and power. Passive and active elements.

1. BASIC ELEMENTS AND DEFINITIONS

Charge and current, voltage, energy, and power. Passive and active elements.

2. RESISTIVE CIRCUITS

Ohm's law. Kirchhoff's laws. Series and parallel resistive circuits.

3. NETWORK THEOREMS

Superposition, Thevenin's and Norton's theorems, maximum power transfer.

4. ANALYSIS METHODS

Nodal and mesh analysis of resistive circuits.

5. ENERGY-STORAGE ELEMENTS

Capacitors and inductors-energy storage, series and parallel connection.

6. SIMPLE RC AND RL CIRCUITS

Source-free RC and RL circuits, time constants and dc steady state response.
Response to a constant forcing function, unit step function, step response.

7. SECOND-ORDER CIRCUITS

Second-order equations, natural and forced responses, parallel and series RLC circuits.

8. SINUSOIDAL EXCITATION AND PHASORS

Properties of sinusoids, complex excitations, phasors, impedance and admittance, Kirchoff's laws and impedance combinations.

9. AC STEADY-STATE ANALYSIS

Nodal and mesh analysis, network theorems, phasor diagrams.

10. AC STEADY-STATE POWER

Average power, RMS values, power factor, complex power, power measurements

11. OPERATIONAL AMPLIFIERS

Definitions. Ideal vs Real op-amp. Linear function of op amps. Non linear function of op amp. Op amp applications

12. TRANSFORMERS

Mutual inductance, ideal transformer, reflected impedance.

13. THREE-PHASE CIRCUITS

Y and Δ connections, balanced three-phase circuits.

TEXTS AND REFERENCES

1. Alexander and Sadiku: ***Fundamentals of Electric Circuits 5^{h} edition***, McGraw-Hill (**Optional**) FREE TEXT: http://www.allaboutcircuits.com/
2. Laboratory hand-outs , notes and assignments (see D2L)

EVALUATION:

Labs: **20%**

Midterms: **40% (2)**

Final: **40%**

GRADING ACCORDING TO COLLEGE POLICY (GPA)