

CAMOSUN COLLEGE

DEPARTMENT OF ELECTRONICS

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

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

1. **BASIC ELEMENTS AND DEFINITIONS**
Charge and current, voltage, energy, and power. Passive and active elements.
2. **RESISTIVE CIRCUITS**
Ohm's law. Kirchoff'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 5th edition**, McGraw-Hill (**Optional**) FREE TEXT: <http://www.allaboutcircuits.com/>
2. Laboratory hand-outs , notes and assignments (see D2L)

EVALUATION:

Assignments: 5%

Labs: 20%

Midterms: 35% (2)

Final: 40%

GRADING ACCORDING TO COLLEGE POLICY (GPA)