Electronics & Computer Engineering Technology

ECET 250E Linear Circuits-1
COURSE SYLLABUS

ECET 250E LINEAR CIRCUITS 1

OFFERED:	Fall semester 2019
CREDIT:	4
WORKLOAD:	4H Lecture, 2.5H Lab
PREREQUISITES:	Restricted to students taking the Engineering Bridge Program

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1. Intended Learning Outcomes

At the end of the course, student should be able to demonstrate knowledge of basic electronic circuit theory, linear circuit analysis techniques, operational amplifiers, three phase systems and transformers.
Students should be able to apply the theory to laboratory hands on exercises.

2. Required Materials

a. Alexander and Sadiku: Fundamentals of Electric Circuits 5h edition, McGraw-Hill (made Optional) FREE TEXT: http://www.allaboutcircuits.com/

b. Laboratory hand-outs, notes and assignments (Available on D2L)

3. Course Content

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. 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.

4. Labs

1. Hands on Experience with Lab equipment
2. Implementation of simple circuits using breadboard, resistances and dc power supply
3. Introduction to circuit analysis using NI simulation software – MULTISIM
4. Resistive dc circuits
5. Investigation of Thevenin's theorem and maximum power transfer
6. First order transient circuits
7. Second order circuits
8. Investigation of ac resistive and resistive-capacitive circuits
9. Investigation of ac resistive-inductive circuits
10. Investigation of an RLC circuit in ac series and parallel resonance
11. Power in ac
12. Simple Op Amp Circuits
13. Transformers

5. EVALUATION:

Labs:	22%
Quizzes :	06%
Assignments:	02%
Term Tests (1 and 2):	35%
Final:	35%

GRADING ACCORDING TO COLLEGE POLICY (GPA)

A minimum of 60% must be achieved in both the theory and lab portions to pass the course. Less than 60% in either portion will result in a failure of the entire course and **minimum of 50% must be achieved in Final exam to pass the course.**

All labs and lab reports must be completed satisfactorily to obtain credit for the course. Normally, the lab report is due by the start of the lab period in the following week. Late labs will be penalized by 10% per day. You are required to attend and be on time for ALL labs. Failure to attend a lab without a valid excuse may result in being assigned a failing grade for that lab. If you cannot attend a lab (for a valid reason) please inform your lab instructor (ahead of time if possible) and arrange to make it up.