COURSE OUTLINE

ELEC 343 – Advanced Circuit Analysis

Prepared By: Dr. Rashid Aidun
A. **TITLE**: Advanced Circuit Analysis

B. **COURSE NUMBER**: ELEC 343

C. **CREDIT HOURS**: 3

D. **WRITING INTENSIVE COURSE**: NO

E. **COURSE LENGTH**: 15 weeks

F. **SEMESTER OFFERED**: FALL

G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY**: 3 lecture hours per week

H. **CATALOG DESCRIPTION**: An advanced course designed to give students upper level circuit analysis experience. Topics include: Resistive Circuits, Nodal and Loop Analysis, Two-Port Networks, Application of Laplace Transform. Electric circuit theory is introduced with emphasis on mathematical definitions of circuit elements. Network analysis techniques are presented within the framework of direct and alternating current theory. Transient forced and complete responses of circuits involving resistance, inductance, and capacitance are analyzed via differential and integral calculus. Circuit Design using Operational Amplifiers.

I. **PRE-REQUISITES/CO-COURSES**: ELEC102/129 [Electric Circuits II/lab] and MATH 261 [Differential Equations], or permission of instructor.

J. **GOALS (STUDENT LEARNING OUTCOMES)**

By the end of this course, the student will be able to:
   a. Develop skills to solve more complex circuit problems
   b. Analyze first and second-order circuits
   c. Apply differential and integral calculus to capacitive and inductive circuits
   d. Perform Laplace Transform calculations
   e. Perform basic circuit design

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<th>Course Objectives</th>
<th>Institutional SLO</th>
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<td>a. Develop skills to solve more complex circuit problems</td>
<td>2. Critical Thinking</td>
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<td>b. Analyze first and second-order circuits</td>
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**K. TEXTS:**


**M. EQUIPMENT:** None

**N. GRADING METHOD:** A-F

**O. MEASUREMENT CRITERIA/METHODS:**
Exams
Participation
Quizzes

**P. DETAILED TOPICAL OUTLINE:**

1. Review of resistive circuits
   a. Single-Loop Circuits
   b. Single-Node-Pair Circuits
   c. Circuits with Dependent Sources
   d. Design Examples
2. Nodal and Loop Analysis
   a. Nodal Analysis
   b. Loop Analysis
   c. Application Examples
   d. Design Examples
3. Operational Amplifiers
   a. Terminal behaviors of Ideal Op-Amp
   b. Inverting Amplifiers
   c. Non-Inverting Amplifiers
   d. Summing Amplifiers
   e. Difference Amplifiers
   f. Cascade Op Amp Circuits
   g. Digital to Analog Converter
4. First-and Second-Order Transient Circuits
   a. Introduction
   b. First-Order Circuits
   c. Second-Order Circuits
   d. Application Examples
   e. Design Examples
5. The Laplace Transform
   a. Two Important Singularity Functions
   b. Transform Pairs
   c. Properties of the Transform
   d. Performing the Inverse Transform
   e. Convolution Integral
   f. Initial-Value and Final-Value Theorems