Academic Course Description

King Saud University
Electrical Engineering Department

EE202: Electric Circuit Analysis

First Semester 1426/1427 (2005/2006)

Instructors: **(1)** **Dr. Nazar Hussain Malik**
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<u>**Text Books:**</u>

- Electric Circuits (6th Ed.), by James W. Nilsson and Susan A. Riedel, Addison Wesley
- Engineering Circuit Analysis (6th ed.) by W.H. Hayt, J.E. Kemmerly, and S. Durbin

<u>**Support Reference:**</u>

- Electronic Devices and Circuit Theory (7th ed.) by R. Boylestad and L. Nashelsky

Pre-requisites: EE 201 and MATH 107

Co-requisites : -- -- --

Course Objectives: To clearly understand the basic concepts and techniques dealing with analysis of circuits such as three-phase circuits, two-port circuits, frequency selective circuits and filters of different types, circuits containing mutual inductance, transformers, diodes and Op-Amps. The course also addresses the concepts and techniques for studying, analyzing and understanding the transient response of first and second order circuits with a broad variety of systems from practical systems.

Topics Covered: Frequency response of RLC and frequency selective circuits: Concept of transfer function, resonance, Bode plots, introduction to filters; Two-port networks; Mutual inductance and transformers; Transient analysis of first and second order circuits; Three-phase circuits; Introduction to Op-Amp: Ideal characteristics with simple applications; Diode characteristics, clipping and rectification.

Class / Tutorial Schedule: Three lectures are assigned per week with 50 minute duration for each lecture session. There is also a 50 minute weekly tutorial session associated with this course.

Professional Component Contribution: Students can learn the analysis methods and advanced circuit analysis techniques to deal with a variety circuits configurations and topics. They acquire the basic skills of how to approach and deal with modeling and analysis of real life situations and solve simple simulated design and analysis problems. Students must utilize knowledge of mathematics, physics, systems and circuits and basic engineering sciences in order to effectively analyze a diverse set of advanced circuit analysis problems.

Relationship to Program Objectives: This course contributes to the general objectives listed for an Electrical Engineering Department.

> **Objective A:** By teaching the student how to formulate basic problems and model the associated configurations of a variety of practical systems, in basic circuits, this course supports the objective of producing graduates with a strong foundation in basic sciences.

> **Objective B:** By teaching students how to deal with advanced topics in the analysis and design of a wide variety of circuits and systems, this course helps in the department's production of students with a strong foundation in electrical engineering fundamentals.

> **Objective C:** By motivating and encouraging students in discussions during lectures and tutorials to get basic information and skills in a group environment and provide individual opinion on alternative solution strategies as applied to circuit analysis problems, this course supports the objective of producing graduate with good communication skills.

> **Objective D:** By encouraging the students to learn pertinent ethical and professional standards in dealing with various practical devices modeled as circuits and acquire mutual respect for diverse opinions, this course supports the objective of providing graduates with a broad based education so that they can appreciate diversity of options available for solving any particular problem, better understand ethical issues and develop a more global perspective of the profession.

> **Objective E:** By teaching how to design simple circuits for a variety of engineering applications, this course supports the objective of producing graduates with relevant engineering design experience.

Evaluation: There are graded home works, two 2-hours mid-term exams and a three hour final exam. The grade distribution is as follows:

Two Mid-Term Exams	45%
Home Works, Quizzes & Class Participation	15%
Final Exam	40%
Total	100%

Challenges and Actions taken to improve the Course: Some basic background and pre-requisite type material are often reviewed during the course, notably those related to the AC and DC circuits, mathematics and computations with complex numbers. In addition, the relationship between a circuit model and the function of real life device is pointed out to increase the student's interest in the topic

Weekly Teaching Plan

Week #	Deliverables
1	Balanced three-phase voltage sources and analysis of the Wye-Wye circuits
2	Analysis of the Wye-Delta circuits and power in balanced three-phase circuits
3	The natural response of first order(RL and RC)circuits
4	The step response of RL and RC circuits , general solution method for transients and sequential switching in circuits
5	Natural response of a parallel RLC circuits and the forms of the natural response
6	The step response of a parallel RLC circuits and natural and step responses of series circuit
7	The concept of self and mutual inductance and basic relations of various quantities in circuits with mutual inductance
8	The ideal transformer and circuits containing ideal transformer and mutual inductance
9	The terminal equations and two-port parameters
10	Analysis of the terminated two-port circuits and introduction to Laplace transform
11	Introduction to frequency response, Low pass, high pass and band pass filters
12	Bode plots, Introduction to resonance: Series and parallel resonance
13	The ideal Operational Amplifier and its applications
14	The ideal diode and half-wave rectification and clipping

September 19, 2005