ENG EK307 Electric Circuit Theory

2008-2009 Catalog Data:
Introduction to electric circuit analysis and design, voltage, current and power quantities, element I-V curves, circuit laws and theorems; energy storage; frequency domain, frequency response, and transient response; sinusoidal steady state and transfer functions; operational amplifiers, design. Includes lab. 4 cr. either sem

Status in the Curriculum: Required

Class/Lab Schedule:
LEC: 4 hrs/wk LAB 2hrs/wk, DIS, 1hr/wk

Textbook(s) and/or Other required Material: Alexander and Sadiku, Fundamentals of Electric Circuits, 3rd edition, McGraw-Hill, 2007.

Reference:
- Thomas and Rosa, The Analysis and Design of Linear Circuits, Prentice Hall
- Neudorfer and Hassul, Introduction to Circuit Analysis, Allyn and Bacon
- Hayt and Kemmerly, Engineering Circuit Analysis, McGraw Hill

Coordinator: William Oliver, Professor, ECE Department

Prerequisites by topic:
1. Calculus
2. Differential equations (basics only) (co-requisite)
3. Physics (basic concepts of electromagnetism) (co-requisite)

Goals:
This course is of such basic importance in engineering that all engineering students are required to take it, and it is a prerequisite to a number of courses in several engineering programs. It is in some respects the first engineering course that the students take, and much effort is expended in weaning them away from past habits of memorizing and regurgitating already-worked problems and instilling an attitude of learning problem-solving skills through practice and applying them to unsolved problems. Emphasis in this first-principles course is placed on gaining conceptual knowledge of electric circuits, concepts of ac circuits and basic frequency-domain analysis, while at the same time having some design and computing experience.

Course Outcomes:
As an outcome of completing this course, students should:

1. Understand the function of basic circuit elements and their current-voltage and power relations
2. Understand how basic elements may be connected in various topologies to create larger systems.
3. Become familiar with circuit analysis tools
4. Understand the concepts of frequency-domain analysis, basic ac circuits, and the concept of impedance.
5. Understand the concept of frequency response and transient response of linear systems.
6. Become familiar with the use of operational amplifiers in circuits design.
7. Have experience with basic electrical and electronics laboratory instruments.
8. Implement design methodology to build practical circuits.
9. Be able to discover the availability of circuit components, commercial circuits, and circuit-analysis software using the internet.
10. Have experience working as a member of a team in the laboratory and in writing brief group reports.
11. Have gained some communication ability during classroom-participation assignments.
12. Have developed some computing skills through homework problems with programming assignments.

Course Outcomes mapped to Program Outcomes:

Program:	**A**	**b**	c	d	e	f	g	h	i	j	k
Course:	1,2,7,8,12	7-10	6,8	10	3,8,9	-	10,11	-	-	-	3,7,8,9
Emphasis:	5	5	4	2	3	-	2	-	-	-	4

1=not at all; 5=a great deal;

Topics in Project Assignments:

- Lab#1 Light emitting diodes
- Lab#2 Resistive Circuits
- Lab#3 Logic gates
- Lab#4 Operational Amplifiers
- Lab#5 Acoustic heart monitor
- Lab#6 Capacitor timing circuits
- Lab#7 Transient RLC circuits
- Lab#8 Steady State RLC Circuits
- Lab#9 Active Filters

Contribution of Course to Meeting the Professional Component:
Engineering topics: 100%

Prepared by: William Oliver **Date:** June 4, 2009