DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING
COURSE SYLLABUS

EE 251: Basic Electrical Engineering

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
Basic Electrical Engineering	**EE 251**	**251هـ ك**	**3**	**2**		**4**
Pre-requisites:	PHYS 202					
Course Role in Curriculum *(Required/Elective):*	Required Course					
Catalogue Description: Electric quantities and circuit elements. Kirchhoff's laws. Mesh and node analyses. Sinusoidal steady-state analysis using phasors. Network theorem and transformations. Ideal transformers. Three-phase circuits. Introduction to electrical machines. Operational amplifiers and Diodes						

***Textbooks*:**

C.K. Alexander and M.N.O. Sadiku, Fundamentals of electric circuits, 4th ed, McGraw-Hill,

***Supplemental Materials*:**

W. H. Hayt, Engineering Circuit Design, 8th. Ed. McGraw-Hill 2008.

***Course Learning Outcomes*:**

By the completion of the course the student should be able to:

1. Understand fundamental electric quantities: voltage, current, electric power and energy, dependant and independent voltage and current sources.
2. Calculate the currents and voltages in resistive circuits using Ohm's law, KCL, KVL, reduction of series and parallel resistances, voltage and current divisions, nodal and mesh analysis, and superposition.
3. Apply KVL, KCL, nodal and mesh analysis to circuits containing dependent sources.
4. Apply network theorems to simplify a resistive circuit by finding the Thevenin or Norton equivalent of a two-terminal network
5. Evaluate effective or rms values of AC voltages and currents, find the phasor voltage (current) for a given sinusoidal voltage (current), and find the sinusoidal voltage (current) for given phasor voltage (current) and frequency.
6. Convert an AC steady-state circuit to a phasor circuit and analyze a phasor circuit using Ohm's law, KCL, KVL, reduction of series and parallel impedances, and voltage and current divisions.
7. Calculate AC steady-state power dissipated by the circuit elements in a circuit and express the concepts of power factor, complex power, and conservation of power.
8. Solve single and three phase circuits for the real, reactive and complex power and explain the principle of power measurement and instrumentation
9. Derive the voltage and current relationship for an ideal transformer
10. Explain the operation and construction of DC machines, and derive the emf equation.

11. Explain the Concept of rotating magnetic field, principle of operation, and constructional features of three-phase induction and synchronous machines
12. Work with a small team to carry out experiments in electric circuits and prepare reports that present lab work.

Topics to be Covered:		***Duration in Weeks***
1.	Fundamental electric quantities: voltage, current, power and energy	1
2.	Resistance, capacitance and inductance, Kirchhoff's laws (KVL & KCL), Source equivalence and series and parallel equivalent resistance	1
3.	Mesh current (loop) and node voltage analysis	1.5
4.	Circuit theorems	1
5.	Sinusoidal excitation, average and effective values	0.5
6.	Steady state A.C. circuit and impedance and phasor diagrams	2
7.	AC power analysis Power triangle and power factor correction	1
8.	Balanced three phase circuits and power measurement	1.5
10.	Introduction to electromagnetism and Ideal transformer	1.5
11.	Introduction to DC machines	1
12.	Introduction to three phase induction motors	1
13.	Introduction to synchronous machines	1

Student Outcomes addressed by the course: (Put a ✓ sign)

(a)	an ability to apply knowledge of mathematics, science, and engineering	✓
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	✓
(c)	an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d)	an ability to function on multidisciplinary teams	✓
(e)	an ability to identify, formulate, and solve engineering problems	
(f)	an understanding of professional and ethical responsibility	✓
(g)	an ability to communicate effectively	✓
(h)	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	✓
(i)	a recognition of the need for, and an ability to engage in life-long learning	
(j)	a knowledge of contemporary issues	✓
(k)	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Key Student Outcomes assessed in the course: (d)

Instructor or course coordinator: Dr. Mohamad N. Ajour
Last updated: September 02, 2013