FUTURE UNIVERSITY IN EGYPT جامعة المستقبل

Faculty of Engineering & Technology

Electromagnetic Waves 1

Information :

Course Code :	COM 213	**Level :**	Undergraduate	**Course Hours :**	3.00- Hours

Department : Department of Electrical Engineering

Instructor Information :

Title	Name	Office hours
Lecturer	Mohamed Mokhtar Saad Fahim Hefny	4
Lecturer	Mohamed Mokhtar Saad Fahim Hefny	4
Assistant Lecturer	Ahmed Essam Fahim Zahran	5
Assistant Lecturer	Mostafa Mohamed Salaheldin Abdelkhalek	
Teaching Assistant	Mohamed Ibrahim Mohamed Ibrahim	

Area Of Study :

Enrich the studentsôknowledge of the fundamentals of steady electric and magnetic fields.
Prepare students to analyze the different magnetic circuits.
Prepare the students how to use Gauss's, Stoke's and Laplace equations

Description :

The course includes the different coordinate systems used in solving vector field problems. Coulomb's law relation of electric field intensity with different charges, the electric flux density, Gauss'law and the divergence theorem. Relation between the electric field and the force exerted on charges, and energy expended in this motion. The potential gradient, and the dipole moment. The application of the previous laws to some materials- conductors, semiconductors, and dielectrics. Boundary condition for electric and magnetic fields. Laplace and Poisson equations in three coordinate systems. Relation of steady magnetic field, its curl, and Stoke's theorem. Faraday'law. Magnetization, relation between magnetic flux density and magnetic field. Magnetic reluctance and magnetic circuits. Different magnetic materials.

Course outcomes :

a.Knowledge and Understanding: :	
1 -	Recognize the electric field due to different charges.
2 -	Estimate the proper equation to find the electric flux.
3 -	Select different coordinates for solving electrostatic problems.
4 -	Explain different magnetic circuits.
5 -	Estimate the electric and magnetic forces and stored energies.
b.Intellectual Skills: :	
1 -	b1. Compare between the different boundary conditions for electric and magnetic fields.
2 -	b2. Investigate the best current intensity suitable to create a necessary magnetic flux density.

c.Professional and Practical Skills: :	
1 -	Apply theories of mathematics, to solve electrical field for different types of charges.
2 -	Apply theories of mathematics, to solve magnetic field problems.
d.General and Transferable Skills: :	
1 -	Communicate Effectively.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Coulomb's law, force and electric field	10	6	4
Electric flux density, electric flux, line charge density, surface charge density, and volume charge density	10	6	4
Divergence theorem and Gauss' law	5	3	2
Electric potential, work done and stored electric energy	5	3	2
Material: conductors, semiconductors, and dielectric. Dipole moment	10	6	4
Steady state magnetic field, Faraday's law	10	6	4
Magnetic flux, flux density, electric current and current density	5	3	2
Magnetic materials, magnetization	5	3	2
Magnetic circuit, magnetic motive force, and reluctance	5	3	2
Inductance, self, and induced	5	3	2
Vector analysis	5	3	2

Teaching And Learning Methodologies :

Lecture
Research
Studio Work

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Final-term	40.00	15	to assess the comprehensive understanding of the scientific background of the course, to assess the ability of problem solving with different techniques studied
First Mid-Term Exam	15.00	7	to assess the skills of problem solving, understanding of related topics.
Performance	10.00	14	
Quizzes and Assignments	20.00	14	to assess the ability of applying electromagnetic laws in solving and understanding of different technical issues.
Second Mid-Term Exam	15.00	11	to assess the skills of problem solving, understanding of related topics.

Course Notes :

No course notes are required

Recommended books :

1. W.H.Hayat, J.A. Buck," Engineering Electromagnetics", McGraw Hill, 8th edition, 2012.
2. John Kraus, Daniel Fleisch," Electromagnetics" Mc Graw Hill, 5th edition.