0

Department of Electrical Engineering	
Electromagnetic II (63374)	
Total Credits	**3**
major compulsory	
Prerequisites	P1 : Electromagnetic I (63270) OR Electromagnatics (63251)

Course Contents

Magnetic Forces; Magnetic Circuits; Inductance; Faradays Law; Displacement Current and time varying Maxwells equations; Transmission lines; Plane electromagnetic waves; Reflection and transmission of plane EM waves; Introduction to waveguides.

	Intended Learning Outcomes (ILO's)	Student Outcomes (SO's)	Contribution
1	Using complex calculus, vector algebra; vector calculus; and basic physical principles to EM field problems.	A	45 %
2	Analyzes and design of components and/or programs in relation to electromagnetic field problems, through the usage of software and/or hardware tools.	C	10 %
3	Solving basic electromagnetic guided and unguided wave propagation problems; Reflection and refraction problems; with all associated wave parameters and power calculations.	E	45 %

Textbook and/ or Refrences

Engineering Electromagnetics, William H. Hayt and John A. Buck; 8th Edition; McGraw-Hill International Editions, 2012. Field and Wave Electromagnetics, David K. Cheng; Addison-Wesley Publishing Company; Second Edition 1989. http://en.wikipedia.org/wiki/Electromagnetic_field

Assessment Criteria	Percent (%)
First Exam	20 %
Second Exam	20 %
Projects	10 %
Final Exam	50 %

Course Plan

Week	Topic
1,2	Magnetic Forces: Lorentz Force equation; Magnetic Forces and Torques; Magnetic materials and permeability; Magnetic Boundary conditions; Magnetic Circuits; Magneto-static energy; Inductance and Mutual inductance; Summary of Maxwells equations for static and steady fields. Faradays Law and applications;
3	Time-Varying Fields and Maxwells Equations: Displacement current; Point form and Integral forms of Maxwells equations; Electromagnetic Boundary Conditions; Retarded potentials.
4,5	Transmission Lines: General Transmission Line Equations; TL Parameters; Lossless propagation; Lossless propagation of sinusoidal voltages; Complex analysis of sinusoidal waves; Solution of Transmission line equations in phasor form; lossless and low loss propagation; Power transmission and losses; First Exam
6	Wave reflections on TL; VSWR; Finite length TL
7	Smith Chart;
8,9	Uniform Plane Electromagnetic Waves: Wave equations and their solutions; Propagation in free space; Propagation in dielectrics; propagation constant; intrinsic impedance; phase

	velocity, phase constant; attenuation constant, wave length; Flow of electromagnetic power and Poynting's Vector (Poyntings Thm.);
10	Propagation in good conductors; Skin effect; Polarization of waves;
11	Reflection and Dispersion: Normal Incidence at a Plane Dielectric Boundary; Normal Incidence at Plane Conducting Boundary; SWR;
12	Reflection from multiple interfaces; Propagation in arbitrary directions; Oblique Incidence at a Plane Dielectric Boundary (Perpendicular Polarization and Parallel Polarization); Second Exam
13	Oblique incidence at dielectric interfaces continued; Oblique Incidence at Plane Conducting Boundary; Total Reflection and Total Transmission;
14	Dispersion and Pulse expansion;
15	General Review