

Department of Electrical Engineering			
Electromagnetic I (63270)			
Total Credits		3	
major compulsory			
Prerequisites		P1 : Electrical Circuits I (63211)	
Course Contents			
Electrostatic fields; Potential; Dielectrics; Steady Current; Electrical Materials; Boundary conditions; Magneto-static Fields; Differential and integral forms of Maxwells equations for static and steady fields.			
Intended Learning Outcomes (ILO's)		Student Outcomes (SO's)	Contribution
1	Using vector algebra, vector calculus, and physical principles to solve static and steady field problems	A	45 %
2	Analysis and design of resistors and capacitors and the calculations of associated parameters.	C	10 %
3	Solution of electrostatic and magneto-static problems (ie: electrostatic and magnetostatic fields). As well as solving for charges, currents, potentials and energy. Also applying boundary conditions.	E	45 %
Textbook and/ or References			
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. Web resources.			
Assessment Criteria		Percent (%)	
First Exam		15 %	
Second Exam		15 %	
Quizzes		10 %	
Projects		10 %	
Final Exam		50 %	
Course Plan			
Week	Topic		
1,2	Vector Analysis: Scalars &vectors; Vector algebra; The Cartesian coordinate system; Vector components and unit vectors; Vector field; Dot product; Cross product; Cylindrical coordinate system; Spherical coordinate system.		
3,4	Electrostatics: Coulomb law; Electric field intensity; Field of several point charges; Field of a continuous charge distribution;		
5	Electric flux density; Gausss law; Examples for Gauss law;		
6,7	Divergence; Maxwells first equation; The del operator and the divergence theorem; Energy and Electric field; Line integral; Potential difference and potential; First Exam		
8	Solution of first exam; Conservative Field; Potential gradient; Electric Dipole; Electric Energy density.		
9	Electrical Materials: Current and current density; Continuity of Current; Metallic conductors;		
10	Conductor properties and boundary conditions; Method of images; Breif introduction to superconductors and semiconductors		
11	Dielectrics, Boundary conditions for dielectrics; Capacitance Second Exam		

12	Poissons and Laplaces equations: Examples of the solution of the one dimensional Laplaces and Poissons equations.
13	Magneto-static: Biot-Suvar law; Amperes law; Curl;
14	Stokes theorem; Magnetic flux and magnetic flux density; Vector and scalar Magnetic potential; Summary of Maxwells equations for static and steady fields.
15	General review