

	Course name: EE303 Electromagnetic Fields		Department: Electrical and Electronics Engineering			Semester 5
	Methods of Education					Credit (ECTS)
	Lecture	Study Time	Homework	Exam (incl. Preparation)	Total	5
	39	40	36	35	150	
Language	English					
Compulsory/Elective	Compulsory					
Prerequisites	None					
Course Contents	Vector analysis, basics of electrostatic fields, analysis of electrostatic problems under different configuration and steady current problem analysis from field prospective.					
Course Objective	To teach the basics of static electric fields and their applications					
Learning Outcomes and Competences	<p>Students who pass the course will be able to:</p> <ul style="list-style-type: none"> – Differentiate between scalar and vector quantities and their operations – Perform vector addition, subtraction, dot & cross product. – Learn the properties and main operators of main orthogonal coordinate systems (Cartesian, Cylindrical & Spherical) and the conversion between them. – Perform integrals that are containing vectors over a contour, closed or open surface and over a volume – Calculate the vector differential operators (gradient of a scalar, divergence and curl of a vector) under different coordinate systems – Apply divergence theorem, Stockes's theorem & vector null identities – recognize the fundamental postulates of electrostatic in free space (Coulomb's law – Gauss's law) – Calculate electric field due to discrete and continuous charges – Analyze the behavior of dielectric materials & conductors in electrostatic field – Use boundary conditions to analyze electrostatic problems – Calculate (standalone & mutual) capacitance for different configurations – Calculate electric energy, forces & torque. – Apply Poisson's and Laplace's Equations to calculate Electric field and potential. – Apply the "method of image" to calculate Electric field under a number of configurations – Apply the concept of "boundary value problem" for finding possible solutions for V in Cartesian coordinate systems – link electrostatic field knowledge to the circuit theory (Equation of continuity & Kirchoff's current law, Power dissipation and Joule's law) – Use steady current boundary conditions to analyze steady current problems 					
Textbook and /or References	"Field and wave electromagnetics", 2 nd edition, David. K. Cheng					
Assessment Criteria			If any, mark as (X)	Percentage (%)		
	Midterm Exams		X	30		
	Quizzes					
	Homework		X	20		
	Projects					
	Term Paper					
	Laboratory work					
	Other					
Final Exam		X	50			
Instructors	Prof. Dr. Alaaelden Elrouby					
Weekly Schedule						
Week	Subject					
1	Introduction					
2	Vector addition, subtraction & Product					
3	Orthogonal Coordinate Systems					
4	Vector integrals & Differential Operators					
5	Vector integrals & Differential Operators					

6	Fundamental Postulated of Electrostatic
7	Electrostatic due to Charge Distribution
8	Electrostatic in Different Media
9	Mid-term Exam
10	Electrostatic Application Overview
11	Capacitance & Capacitors
12	Poisson's and Laplace's Equations
13	Boundary Value Problem
14	Steady Electric Current
15	Review (if time permits)