Course Title	Electric and Magnetic Fields				
Course Code	ECE225				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	2nd Year / 3rd Semester				
Teacher's Name	TBA				
ECTS	6	Lectures / week	3 hours / 14 weeks	Laboratories / week	N/A
Course Purpose and Objectives	The objective of this course is to provide participants an overview of fundamental concepts of electric and magnetic field theory. The basic laws of electromagnetism are thoroughly described and applied to elementary problems involving steady and alternating fields and currents. Students are also presented to the nature and application of electromagnetic fields in engineering.				
Learning Outcomes	Upon successful completion of this course, students should be able to: • State and explain the definitions and physical significance of the important quantities in basic electricity and magnetism (electric charge and force, electric field and flux, electric energy and potential, capacitance, magnetic force, magnetic field and flux, mutual and self inductance) • Define the basic laws and relationships between these quantities and the behavior of the Electric and Magnetic Fields • State, explain and apply Maxwell's equations to solve problems • Explain the fundamental relationships as embodied in Maxwell's equations • Analyse transmission lines, transformers and stubs • Evaluate wave propagation in different media				
Prerequisites	PHY110	Co-requisites	None		
Course Content	Vector Analysis: Overview of vector analysis. Introduction to cartesian coordinates and vector calculations. Electric charge and force: The Coulomb's Law. Overview of the electric field. Addition of electric forces and fields. Principle of superposition and electric field lines. Electric dipole: Electric flux and Gauss's Law. Using Gauss's Law in application examples. Overview of conductors in electric fields. Electric potential and potential difference: Finding the electric potential. Conservative nature of the Electric field.				

	Capacitance: Capacitance calculation. Dielectrics. Electric current and resistance. Electromotive force. Kirchoff's laws: The RC circuit. The magnetic field and magnetic field lines. Magnetic flux. The Lorentz force Biot-Savart Law: Torque on a current loop. Magnetic dipole. Ampere's Law. Electromagnetic Induction: Faraday's Law. Lenz's Law. Mutual and self inductance. Magnetic Energy: Maxwell's modification of Ampere's Law. Maxwell's equations and electromagnetic waves. Transmission line theory: Time and space dependence of signals. Transmission line parameters, standing wave ratio, input impedance. Impedance matching: Wave propagation, types of transmission lines, Smith chart, Line stub matching, quarter wave transformer and impedance matching. Waveguides: Propagation modes and equations. Cut-off frequency and wavelength.
Teaching Methodology	Face- to- face
Bibliography	F.T Ullaby, E. Michielssen and U. Ravaioli, Fundamentals of Applied Electromagnetics, 2nd Edition, Prentice Hall, 2010. H.D. Young, R.A. Freedman and L. Ford, University Physics, 12th Edition, Addison-Wesley, 2006. W.H. Hayt and J.A. Buck, Engineering Electromagnetics, Mc-Graw Hill, 2012. D.M. Pozar, Microwave Engineering, 3rd Edition, Wiley, 2009.

Assessment	Examinations 70% Assignments/Lab 20% Class Participation and Attendance 10% 100%
Language	English