

Course Code	ECE230
Course Name	Fields and Waves
Credits	4
Course Offered to	UG - Second Year
Course Description	This is an introductory course to electrodynamics (along with electrostatics and magnetostatics). This course will serve as a foundational course for students interested in working in RF and micro-wave, millimeter wave and optical systems.

Pre-requisites		
Pre-requisite (Mandatory)	Pre-requisite (Desirable)	Pre-requisite (Other)
MTH100 (Vector calculus)		

*Please insert more rows if required

Post Conditions* (For suggestions on verbs please refer the second sheet)				
CO1	CO2	CO3	CO4	CO5
Students are able to execute vector calculus operations (gradient, divergence, curl, line, surface and volume integrals) in Cartesian and curvilinear coordinates	Students are able to use Coulomb's law, Gauss's law and Poisson's equation to solve for electric field, flux density and potentials for point, line, surface and volume charge distributions	Students are able to use Biot-Savart's law and Ampere's law to solve for magnetic field and flux density	Students are able to analyze Maxwell's equations of time-harmonic fields to describe electromagnetic wave propagation in different media and across boundaries	Students are able to analyze electromagnetic wave propagation through simple transmission lines

Week Number	Lecture Topic	COs Met	Assignment/Labs/Tutorial	Reference
1	<i>Vector Analysis</i> - Vector algebra, differential calculus, integral calculus, curvilinear coordinates	C01	Reading assignment, homework	Hayt / Griffiths
2,3	<i>Electrostatics</i> - Coulombs law, electric field, Gauss's law, electric potential, energy and potential, electric fields in matter, Poisson's and Laplace's equations	C02	Reading assignment, homework	Griffiths
4,5	<i>Magnetostatics</i> - Biot-Savart's law, magnetic field, Ampere's law, magnetic fields in matter	C03	Reading assignment, homework	Griffiths

6,7	<i>Electrodynamics</i> - electromotive force, electromagnetic induction, Maxwell's equations	C04	Reading assignment, homework	Griffiths
8,9,10	<i>Electromagnetic waves propagation</i> - the Helmholtz wave equation, electromagnetic waves in vacuum and in matter, Poynting vector, reflection and transmission at normal incidence, reflection and transmission at oblique incidence	C04	Reading assignment, homework	Hayt, Saduku
11,12,13	<i>Transmission lines</i> equations and parameters (time domain and frequency domain), standing wave ratio	C05	Reading assignment, homework	Saduku

*Please insert more rows if required

Assessment Plan	
Type of Evaluation	% Contribution in Grade
Mid-sem	30
End-sem	35
Quiz	15
Homework	20

*Please insert more row for other type of Evaluation

Resource Material	
Type	Title
Textbook	Introduction to Electrodynamics, Third Edition, David J. Griffiths
Textbook	Engineering Electromagnetics, Eighth Edition, Hayt, Buck and Akhtar
Textbook	Principles of Electromagnetics 4th Edition, Mathew N. O. Sadiku.