Electromagnetic Field Theory

Catalog: Electrostatics; Laplace's Equation; the theory of dielectrics; magnetostatics; electromagnetic induction; magnetic fields of currents; Maxwell's equations. Credit for both ENPH 332 and PHYS 332 will not be awarded

Hours: 3 hours (3 lecture/0 lab)

Prerequisites: University Physics II; Differential Equations or Calculus III (Co-requisite)

Campus Numberings:

Midwestern State University	PHYS 3323	Texas A&M University-Corpus Christi	PHYS 3311:001
Prairie View A&M University	PHYS 3123	Texas A&M University-Kingsville	PHYS 3323
Tarleton State University	PHYS 332	Texas Southern University	PHYS 333
Texas A&M University-Commerce	PHYS 412	West Texas A&M University	PHYS 3340

COURSE LEARNING OBJECTIVES:

Course Goals Upon completion of this course, students will	**Assessment**
1. know Coulomb's law and be able to use it to solve for the electrostatic force applied upon a point charge by a collection of other point charges.	Embedded Course Assessment
2. know the definitions of standard terms in electromagnetism including electric potential, electric field, magnetic field, magnetic vector potential, induction, capacitance, etc.	Embedded Course Assessment
3. know the formula for the electric field due to an infinitesimal point charge and be able to use it to calculate the electric field due to either a collection of discrete point charges or a continuous surface, line or volume charge density.	Embedded Course Assessment
4. know the formula for the electric potential due to an infinitesimal point charge and be able to use it to calculate the electric potential due to either a collection of discrete point charges or a continuous surface, line or volume charge density.	Embedded Course Assessment
5. be able to find the electric field at a point in space given the electric potential	Embedded Course Assessment
6. be able to apply Gauss' Law to solve for the electric field in an electrostatic problem that involves a high degree of symmetry.	Embedded Course Assessment
7. be able to apply various solution techniques including the method images, separation of variables, and multipole expansions to solve Poisson's and Laplace's Equations.	Embedded Course Assessment
8. know the meaning of polarization, displacement vector, and dielectric constant and be able to use these concepts to solve problems involving dielectric media.	Embedded Course Assessment
9. be able to determine the magnetic field created by either a line, area, or volume current density.	Embedded Course Assessment
10. be able to write Maxwell's equations in both integral and differential form.	Embedded Course Assessment

11. be able to show that the solution to Maxwell's equations for time-varying fields in free space are electromagnetic waves with the speed c.	Embedded Course Assessment
12. be able to apply mathematical techniques necessary to solve E&M problems including the application of vectors, vector and integral	Embedded Course Assessment