Course Title: Electromagnetic Fields and Waves
Course Code: EEEG 309
Credit Hours: 3

Course Description:
This course extends the introductory first year course in electricity and magnetism and to provide an in depth understanding of the concepts and engineering application of electromagnetic fields and waves.

Course Contents:

Unit 1: Introduction
Review of electromagnetism, Laplace's and Poisson's equations, Boundary value problems, sinusoidally varying field, Maxwell's equation in phasor form

Unit 2: Uniform Plane Waves
Uniform plane waves in free space, Wave polarization, the wave equation and solutions for material media, Wave impedances and intrinsic impedance, Waves in dielectrics and conductors, Poynting vector, power dissipation, Energy storage, Refraction and reflection, Standing waves, Skin depth.

Unit 3: Transmission Lines
Transmission line configurations, transmission line equations, Primary and secondary parameters, Time domain analysis, Discontinuities and reflection, Shorted and open line, Reflection coefficient, VSWR, arbitrary terminations, Impedance matching, Smith Chart, Matching methods, the dissipative transmission line.

Unit 4: Waveguides
Introduction to waveguides, TE and TM modes in a parallel-plate wave guide, Dispersion, Phase and group velocities, Rectangular waveguides, cylindrical waveguides, Cavity resonators, Dielectric waveguides, Optical waveguides and systems.

Unit 5: Antennas and Radiating Systems
Retarded potentials, The Hertzian dipole, Radiation resistance, Directivity, Aperture and gain, Thin linear antennas, Arrays, Aperture antennas,

References:
1. N. Narayan Rao, *Elements of Engineering Electromagnetics*, PHI, 1992.
2. D. K. Cheng, *Field and Waves Electromagnetics*, Addison Wesley 1989.
3. J. Kraus and K. Carver, *Electromagnetics*, Prentice Hall.
4. J. Reitz, F. Milford and R. Christy, *Foundations of Electromagnetic Theor*y, Narosa, 1993
5. W. Hayt, *Engineering Electromagnetics*, McGraw Hill