ECE 6713 Electromagnetic Theory and Applications 3:0:0:3

Course introduces Maxwell's equations, which underlie electromagnetic wave propagation. The properties of freely propagating plane waves are derived, as well as waves guided by structures, including various two-wire transmission lines, hollow waveguides, and dielectric waveguides. A unified treatment of wave propagation is given in terms of the transmission line representation with examples drawn from microwaves, integrated circuits and optics.

Prerequisites: graduate status and undergraduate EM course (such as ECE 3604 in NYU).

Objectives:

Providing a systematic approach to the Electromagnetic Theory and Applications. Emphasizing on basic mathematical techniques and skills. Facilitating the understanding of the big picture and the relations among various theories and applications.

Weekly Outline:

week 1 Vector Analysis, Divergence Theorem & Stokes' Theorem
week 2 Coulumb's Law & Curl Free Static Electric Field
week 3 Gauss's Law
week 4 Electric Materials and Devices
week 5 Biot-Savart Law, Ampere's Law & Divergence Free Static Magnetic field
week 6 Magnetic Materials and Devices
week 7 Midterm exam
week 8 Time Varying Fields and Maxwell's Equation
week 9 Uniform Plane Wave
week 10 Reflection & Refraction
week 11 Transmission Line
week 12 Waveguides and Cavity
week 13 Antenna and Radiation
week 14 Makeup lectures and/or Reviews
week 15 Final Exam

Suggested Textbooks: (Optional)

Constantine A. Balanis, **Advanced Engineering Electromagnetics, 2nd Edition,** (Any Edition), John Wiley & Sons, Inc

William Hayt & John Buck, **Engineering Electromagnetics** (Any Edition) McGraw-Hills

Any Basic Electromagnetic Textbooks

Grading:

- 18% homework, 4% class participation, 36% midterm, 42% final

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