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Syllabus EE330 Electromagnetics

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CUNY City College

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EE 33000 – Electromagnetics

Fall 2020

Instructor

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Class Information

Schedule: Tu & Th 2:00 pm – 3:15 pm

Classroom: TBA

Text-book: Ellingson, Steven W. (2018) Electromagnetics, Vol. 1. Blacksburg, VA: VT Publishing.

<https://doi.org/10.21061/electromagnetics-vol-1> Licensed with CC BY-SA 4.0 <https://creativecommons.org/licenses/by-sa/4.0>

Grading

1. Homework: 10%
2. Midterm 1: 25%
3. Midterm 2: 25%
4. Final Exam (cumulative): 40 %

There will be no make-up examinations; a missed exam counts as zero

Prerequisites

The students are expected to know the following concepts:

Vector algebra (unit vector; vector addition and subtraction; position and distance vectors; vector multiplication; vector components), Coordinate systems and transformation (Cartesian coordinates; circular coordinates; spherical coordinates; constant-coordinate surfaces), Vector Calculus (Differential length; area and volume; Line, surface and volume integrals; Del operator; Gradient of a scalar; Divergence of a vector and Stoke's Theorem; Laplacian of a scalar).

Topics

Static Electric Fields

Fundamental Postulates of Electrostatics in Free Space.

Coulomb's Law

Gauss's Law and Applications

Electric Potential

Energy Density

Electrostatic Boundary Conditions

Dielectrics in Static Electric Field

Electric Flux Density and Dielectric Constant

Capacitance

Static Magnetic Fields

Fundamental Postulates of Magnetostatics in Free Space.
Amperes Circuital Law
Applications
Magnetic Field Intensity and Relative Permeability
Magnetic Boundary Conditions
Magnetic Energy

Time-Varying Fields & Maxwell's Equations

Faraday's Law of Electromagnetic Induction
Maxwell's Equations
Electromagnetic Boundary Conditions
Wave Equations and their Solutions
Time Harmonic Fields

Plane Electromagnetic Waves

Plane Waves in Lossless Media
Plane Waves in Lossy Media
Group Velocity
Flow of Electromagnetic Power & the Poynting Vector
Normal Incidence at a Plane Conducting Boundary
Normal Incidence at a Plane Dielectric Boundary
Normal Incidence at Multiple Dielectric Interfaces
Oblique Incidence at a Plane Dielectric Boundary

Theory and Applications of Transmission Lines

Transverse Electromagnetic Wave along a Parallel Trans. Line
General Transmission-Line Equations
Wave Characteristics on Finite Transmission Lines
Smith-Chart and its applications in transmission lines

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