

EE 381 - Electromagnetic Fields (Transmission Lines and Electromagnetic Fields) - 3 Hours  
Required course

1. a) 2007-2008 Catalog description

Static electric fields; steady current; static magnetic fields of electric currents and ferromagnetic materials; charged particles in electric and magnetic fields. Prerequisite : EE206

b) 2008 – 2009 Catalog description

Time-harmonic steady-state and transient analysis of radio frequency (RF) transmission lines (T Lines); impedance matching; The Smith chart and its applications; vector analysis; static electric fields and capacitance; steady currents and resistance; static magnetic fields and inductance; electrical and magnetic properties of materials; electric and magnetic boundary conditions; electric and magnetic energies. Prerequisite: EE 205 or equivalent with a grade C or better.

2. Prerequisites by topics

Linear circuit analysis - steady state sinusoidal and transient; complex numbers and phasors; vector analysis; differential and integral calculus; partial differential equations

3. Textbook (s) and/or other required material

Fundamentals of Applied Electromagnetics, Fifth Edition, 2007, Pearson Prentice Hall, Fawaz T. Ulabi; handouts on selected topics. All course material is posted on Blackboard allowing online student access.

4. Class Schedule: Three sessions per week, each 50 minutes, for 14 weeks

5. Topics Covered (Outcomes influenced)

- Steady state and transient wave propagations on lossless transmission lines (7.a, 7.b)
- time-average power (7.b, 7.c)
- impedance matching (7.c)
- transmission line calculations and impedance matching using Smith chart (7.c)
- static electric fields (7.d)
- properties of conductors and dielectrics (7.d)
- resistance and capacitance calculations (7.e)
- static magnetic fields (7.d)
- properties of magnetic materials (7.d)
- self and mutual inductance calculations (7.e)
- electric and magnetic energies (7.d)

6. Contribution of course to meeting the professional component

Engineering science - 75% and Engineering design - 25%

7. Course Outcomes (Program Outcome contributions): In learning the course topics the student will attain the following outcomes

- a. The student will acquire an understanding of the characteristics of radio frequency (RF) transmission lines (A,B,D)
- b. The student will acquire the ability to analyze wave propagation on RF transmission lines (A,B,D)
- c. The student will acquire the ability to calculate voltage, current, power, and impedance on RF transmission lines (A,B,D)
- d. The student will acquire an understanding of the fundamentals of static fields (A)
- e. The student will acquire the ability to understand and analyze passive circuit elements from the static fields perspective (A,B,D)

8. Grading Policy:

The level to which students achieve the course outcomes is determined by the following grading criteria:

There will be 2 tests, 5 quizzes, and a final examination in this course. These are weighted as : 2 tests - 40%; 5 Quizzes - 25%; Final examination - 35%. The course letter grade will be determined by the combined numerical result of all tests, quizzes, and

final examination based on the curve. Homework is assigned and solutions to the assignments are provided. The student is required to submit an one-page essay on a topic of current interest related to electromagnetics on or before the last day of class. A grade of C in the course corresponds to meeting the minimum competency required to understand course topics and attain course outcomes.

9. Relationship of course to program outcomes

label	Program Outcomes (A Graduate from the program will:)	Contribution
A	demonstrate knowledge of the mathematical and scientific foundation of electrical engineering	Strong
B	demonstrate knowledge of and the ability to apply techniques and technology of electrical engineering	Strong
C	complete a design project sequence, culminating in a capstone project at or near the professional level	Foundational
D	demonstrate the ability to acquire new knowledge as needed for success in the electrical engineering profession	Moderate
E	meet Bradley's general education requirements which are based on the principles of liberal education	NA
F	have experience in communicating technical information and working on teams	Foundational
G	understand the importance of professional and ethical behavior	Moderate

10. Prepared by: Prasad N.Shastry

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