EE 333 Electricity and Magnetism

Course title:
Electricity and Magnetism

Class hours:
Monday, Wednesday, Friday 13:00-13:50

Office hours:
TBD

Instructor:
Dr. Anders M. Jorgensen
Workman 227
Phone: 505-835-5450
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Classroom location:
Workman 113

Textbook:

- *Carl T. A. Johnk*, Engineering Electromagnetic Fields and Wave, Second edition, Wiley.

Learning objectives:

1. Expand your basic knowledge of magnetic and electric fields.
2. Gain a physical intuitive understanding of electromagnetic theory.
3. Understand Maxwell's equations.
4. Learn how differential vector mathematics is used to solve electromagnetic problems.
5. Learn to solve static and time-dependent electromagnetic problems in vacuum and in materials.

Prerequisites:

MATH 332 (Vector Analysis).
Physics 122 or 132 (General physics II).

Topics covered:
This course will build on the basic electric and magnetic concepts developed in the physics prerequisites. We will develop Maxwell's equations and use them to solve a variety of problems, including

1. The electric field produced by various charge distributions.
2. The magnetic fields produced by electric currents and time varying electric fields.
3. Forces on charges and current carrying structures due to electric and magnetic fields.
4. Electromagnetic wave propagation in free space and material media.
5. Wave propagation along two-conductor transmission lines.
6. Energy storage in electric fields.
7. Forces and torques in electrostatic systems.

Course work:

1. Reading. You will be required to keep up with the course by reading the assigned sections in the books and writing reading summaries.
2. Active participation in class. Show up and respond to questions.
3. Homework. Assigned approximately weekly.
4. Exams. There will be a total of five exams during the semester.

Grading policy:

1. Active participation in class 10%
2. Reading summaries 10%
3. Homework 20%
4. Five exams 60%

Approximate Lecture Schedule:

Week of	Lecture	Exam
Aug 27	Vector Analysis	
Sep 1	Vector analysis	
Sep 8	Gauss', Ampere's, Faraday's laws	
Sep 15	Maxwell's equations integral form	1
Sep 22	Vector differential relations	
Sep 29	Maxwell's equations in differential form	
Oct 6	Plane waves in a vacuum	
Oct 13	Effects of materials	2
Oct 20	Boundary conditions on EM quantities	
Oct 27	More on material properties	
Nov 3	Plane waves in materials	3
Nov 10	Two-conductor transmission lines	
Nov 17	Circuit model and wave propagation on transmission lines	
Nov 26	Smith chart	4
Dec 1	Electrostatics	
Dec 8	Review	5