EE 4302 – Electromagnetic Engineering II – Fall 2005

Instructor: Prof. Matthew J. Goeckner
Office: EC 2.918
Phone: (972) 883-4293
Email: goeckner @ utdallas . edu

Office Hours:
Monday 2 to 3
Wednesday 3 to 4
Or by appointment (OR WHEN MY DOOR IS OPEN)

Prerequisites:
EE 4301

Class:
Room: ECSN 2.120
Time: MW 12:30-1:45 AM
Final: 11:00 AM Wednesday, Nov 30th.

Texts:
Required: (Actually any book is OK – Homework will come from this book)
Fundamentals of Electromagnetics, Lonngren and Savov
Scitech Publishing, Raleigh NC, ISBN 1-981121-38-3

EE 4302 Class notes
(*Introduction to electromagnetism*, MJ Goeckner)
Found at www.utdallas.edu/~goeckner/emag_class AND!
Found at www.utdallas.edu/~goeckner/emag2_class
THESE NOTES MAY BE UPDATED THROUGH OUT THE SEMESTER
NOTE YOU WILL BE EXPECTED TO LOOK AT OTHER BOOKS

Topics:
Applied elements of electromagnetism:
(THIS IS NOT THE SUBJECT ORDER)
Transmission lines (Review), Antenna (Review)
Fiber optic cables, Waveguides, cavities
Waves incident normal and obliquely to an interface

Grading: (dates subject to change – Tests will be probably be take home.)

Test 1 (Waves at interface + ~1 applied)	20%	Mid October
Project (applied element)	20%	
Rewritten Class notes	20%	(Due each Tuesday)
Homework	20%	(Due each Thursday)
Final	20%	11:00 AM Wednesday, Nov 30th.

**Homework and notes handed in after the due date will not be counted!*
(This means that the homework can be slid under my door that night. I usually arrive at ~8 AM.)

Approximate Topic list and order for EMAG 1 and 2

EMAG 1 in Bold – EMAG 2 not bolded

Section 1 Basic concepts and basic Mathematics

- **History**
- **Maxwell's equations in point and integral form**
- **Concept, Nature and sources of vector fields**
- **Proof of Divergence and stokes theorems**
- **Concept of vector and scalar potential**

Section II – Static electric and magnetic fields

- **Electrostatic fields from point charge sources**
- **Magnetostatic fields from 'point' current sources**
- **Physical properties of materials (types)**
  - **Electric and magnetic dipoles => ε and μ**
  - **Collisions and Drag**
- **Material related electric and magnetic fields**
- **Maxwell's equations and charge conservation**
  - **Equivalence between integral and point forms**
- **Boundary conditions**

Section III – Dynamic electromagnetic fields

- **Wave equation for Electric and Magnetic fields**
- **Vector and scalar potentials for dynamic systems**
- **Solutions to the waves equation**
- **Relationship between Electric and Magnetic fields**
- **Physical properties of materials (types)**
- **Energy and energy propoagation**
- Boundary conditions
  - Normal incident waves
  - Oblique incident waves
- Waves with multiple boundaries

Section IV – Applications for electromagnetic fields

- Antennas
  - **Electric dipole**
  - Magnetic dipole
  - Reflectors
- **Transmission lines**
- Waveguides
  - Microwave
  - Optical
- Cavities (microwaves)