EEC 130B INTRODUCTRORY ELECTROMAGNETICS II (3 Units)
SPRING 2004

Time: 12:10-2:00pm MW
Location: Wellman 6
Instructor: Professor Anh-Vu Pham
3141 Kemper Hall
Phone: 752-7472
Office Hours: 2:00-3:00pm MW

TA: Brendan Crooks
Email: btcrooks@ucdavis.edu
Office Hours: 2:00-4:00pm T
Required Text Book: Umran S. Inan and Zziz S. Inan, Electromagnetic Waves, Prentice Hall

Expanded Course Description
I. Plane Wave Propagation in Arbitrary Media
- A. Maxwell's equations and the wave equation in general, lossy media
- B. Propagation in good conductors - propagation in low loss media
- C. Propagation in arbitrary direction
- D. Review of boundary conditions
- E. Reflection at normal interfaces - transmission line concepts
- F. Total reflection, Brewster angle
- G. Phase shift upon total reflection

II. Guided Waves
- A. Transmission line modes on parallel plates - transmission line equations
- B. Lossy transmission lines
- C. Fundamental wavelength mode on infinite parallel plates
- D. Fundamental mode of rectangular waveguide
- E. Waveguide impedance, propagation constant
- F. Fundamental mode of a planar dielectric waveguide

III. Simple Modulated Waves and Dispersion
- A. Simple amplitude and pulse modulated waves
- B. Group and phase velocity, dispersion
- C. Dispersion in guiding structures
- D. Introduction to optical fibers (optional)

IV. Basic Antennas
- A. The magnetic vector potential
- B. Wave equations for the potentials (with sinusoidal sources)
- C. Retarded potentials
- D. Dipole antenna

Course Outcomes: Students who have successfully completed this course should Understand fundamentals of plane wave propagation in arbitrary media; good conductors, skin depth, and lossy dielectrics. Understand propagation in arbitrary direction, wave vectors, and concept of phase velocity. Understand the application of boundary conditions to plane wave propagation at

normal incidence and oblique incidence. Calculation of total internal reflection, Brewster angle and phase shift upon total reflection at planar dielectric interface. Understand guided waves, TEM, TE and TM modes in transmission lines and TE and TM modes of rectangular metallic guides. Calculation of wave-guide impedance, and propagation constant. Understand how to calculate fundamental mode and propagation constant in planar dielectric wave- guide. Understand amplitude and pulse modulated waves, phase velocity and group velocity. Fourier analysis of spectrum. Concept of group velocity dispersion. Have a basic understanding of magnetic vector potential retarded potentials. Calculation of antenna pattern and radiation resistance of infinitesimal antenna with time-harmonic current source.

Grading:

Homework	10%
Exams (2)	55%
Final Exam	35%

Policy:

1. The UC Davis Code of Academic Conduct applies to this course (see attached). If you are aware of violations of Code of Academic Conduct, EEC130B students and teaching assistants, and readers are expected to report it to me (Pham) immediately. While your identity will be protected, details must be provided. I will turn the case over to Office of Student Judicial affairs as soon as I think a violation of misconduct may have occurred – I will not necessarily contact those against whom allegations have been made.
2. All examinations will be closed book. For the first quiz you will be allowed to bring one sheet, double-sided, of handwritten notes.
3. Examinations will only be given at the scheduled time. No make-up allowed. If you miss an in-class exam, you must take an oral make-up exam.
4. I encourage free discussion of the homework problems amongst one another, but you must formulate your solutions individually. Academic honesty is required; your written work should represent **your** understanding of the problem. Copying is not acceptable and will not be tolerated. **If copying of homework is observed, the matter will be turned over immediately to Office of Student Judicial affairs.**
5. Homeworks are due on days posted **at 4 pm** –in dropbox (location TBA). No late homeworks will be accepted. Solutions will be posted to all homework by 5 pm the homework assignment is due, **but hardcopy will not be given out**. You should make copies of your homework solution so that you can compare it to solutions posted (location TBA). Our objective will be to return all homework within two lectures after it is due – because of the large size of class and limited resources available, this may not be possible.
7. Some selected problems will be graded in more detail. The problems that so will be decided after the homework is turned in.
8. The homework solution must be handwritten and **must clearly readable** – (what is readable will be at the discretion of the teaching assistants)
9. All homework pages must have a name clearly printed on the top right hand corner. All pages must be stapled together. Do not fold the pages.
10. In all work a clear notation for vectors and scalars must be used.
11. In all work units must be provided on all answers.