Engineering 6814 (Electromagnetics for Communications I)
Course Particulars
Term 6, Fall 1999
Class of 2001

INSTRUCTOR: Eric Gill Office: EN4011 Phone: 737-3801

COURSE RATIONALE

This course, offered to computer engineering students, is intended to provide a background in the fundamental concepts and applications of electrostatics, magnetostatics and electromagnetic fields. It is designed to provide much of the mathematical and physical foundation necessary for the derivation of the governing equations of various communication channels (eg. transmission lines, waveguides and antennas). The latter topics are the subjects of more advanced courses.

TEXT: Fundamentals of Applied Electromagnetics, 2001 Media Edition.
by Fawaz T. Ulaby.

COURSE OUTLINE

The text portions referenced in this course outline are, in some cases, not exhaustive of the material covered and, in other cases, contain more information than is required for the course.

Unit 1 Vector Calculus

1–1 Review of Basic Vector Properties (Chp.1 and back flyleaf)
1–2 Line, Surface and Volume Integrals (not explicitly in text)
- with applications

1–3 Vector Differential Operators (pp 24-27, 29, 143-145, 213-214, back cover)
- gradient (with applications)
- divergence (with applications)
- curl (with applications)

1–4 Vector Theorems
- Gauss' (or divergence) theorem (Section 9.3)
- Stokes' theorem (p. 319)
- Green's theorem (not in text)

Unit 2 Maxwell's Equations (Chp. 2 and sections as listed)

2–1 Introduction and Review
- Gauss' law (Electric) (Section 9.3)
- Gauss' law (Magnetic) (p. 445)
- Ampere's law (p. 445)

2–2 Conservation of Charge (or Continuity of Current)

2–3 Boundary Conditions (pp 84-88)
2–4 Maxwell's Equations
- non-time-varying
- time-varying
- time-harmonic fields
- Lorentz force law
- Poynting's theorem

Unit 3 Plane Wave Propagation (Chps. 3 and 4)

3–1 Uniform Plane Waves in Free Space
3–2 Polarization
3–3 Plane Waves in Perfect Dielectrics
3–4 Plane Waves in Lossy Dielectrics
3–5 Propagation in Good Conductors
3–6 Reflection and Transmission of Plane Waves

Unit 4 Applications in Communications

Evaluation Scheme

Evaluation Instrument	Value	Date
Assignments	10%	Biweekly
Term Tests (2)	40%	Oct. 15 Nov. 22
Final Exam	50%	Wk. of Dec. 8-13