

Electromagnetic Fields and Waves

UNIVERSITY OF CALIFORNIA AT SANTA BARBARA
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

This senior elective covers the essential ingredients of electromagnetic wave theory required for a sound understanding of modern high-frequency electronics. Maxwell's equations will be the starting point, launching us into a discussion of electromagnetic wave propagation on transmission-lines, waveguides, and free-space. The course will emphasize fundamental principles, with applications of the theory to modern wireless communications and radar systems operating at microwave and millimeter-wave frequencies. Some attention will be given to impedance-matching, filters, and other important passive building blocks.

Tentative Schedule:

- Week 1: Review of Transmission-line theory
- Week 2: Smith charts, Impedance matching
- Week 3: EM Review, Plane Waves
- Week 4: Plane-wave Reflection/Refraction
- Week 5: General Waveguide Theory
- Week 6: S-parameters, Network Analysis
- Week 7: More Impedance Matching
- Week 8: Periodic Structures & Filters
- Week 9: Radiation/Diffraction
- Week 10: Antenna Systems

The weekly homework assignments are an extremely important part of the course, so the homework grade will be a significant fraction of the course grade. The final exam will be comprehensive, but since the material at the end of the course builds on previously covered topics, it will be essentially similar to the mid-term. The discussion/lab section will be used for computer simulations using Agilent's ADS software, an industry standard.

Prerequisites:	ECE 134 or equivalent
Instructor:	Bob York, Room 2215F, ESB, x7113
Time and Place:	TR 12:30-1:45PM, North Hall 1105
Office Hours:	TR 2-3:00 PM, otherwise by appointment
Course Web:	http://my.ece.ucsb.edu/bobsclass
Textbooks:	Required text: <i>Field and Wave Electromagnetics</i> , 2nd ed. by David K. Cheng Addison-Wesley, 1989, ISBN: 0-201-12819-5
	Optional texts: <i>Microwave Engineering</i> , 2 nd edition by D. M. Pozar 1998 ISBN: 0-471-17096-8
Grading:	Homework 30% (This breakdown is subject to change) Mid-Term 30% Final exam 40%
TA:	Tammy Ben-Yaacov tammy@umail.ucsb.edu
TA Hours:	TBA
