

Electromagnetic Theory II

University of California at Santa Barbara
Department of Electrical and Computer Engineering

Topics will include a subset of the following: advanced theorems and problem solving techniques (uniqueness, reciprocity and reaction, field-equivalence principles, general TE & TM field decomposition), waveguide excitation and discontinuity analysis, dyadic Green's function formalism, Huygen's principle and relation to field equivalence principles, integral equations, rigorous electromagnetic scattering/diffraction theory, numerical techniques (method of moments, finite-difference time-domain), classical field-matter interaction, Ewald-Oseen extinction, permittivity/permeability tensors, Faraday rotation/bi-refringence, propagation in dispersive media, Kramer-Kronig relations, propagation velocities, radiation from moving charges, Lienard-Wiechert potentials, elements of special relativity, Doppler shift, Cerenkov radiation, and possibly other interesting aspects of electromagnetics following the peculiar whims and unusual neural activity of the instructor!

Clearly this is a theory-oriented course. Therefore, discussion of advanced mathematical techniques like eigenfunction expansions, complex integration, and dyadic Green's function analysis are an important aspect of the course. The incentive for mastery of these techniques transcends the pedestrian pursuit of a good grade; the techniques are applicable to most branches of physics, yes, even the beloved quantum mechanics. On the other hand, our primary goal is practical problem solving, and therefore the weekly homework assignments are an extremely important part of the course, and will constitute the majority of the final grade. As the great Leonardo Da Vinci once said, "Science is the captain, practice the soldiers". The final exam will be a take-home exam.

Prerequisites:	ECE 201A or equivalent	
Instructor:	Bob York, Room 5113, Engineering I, x7113	
Time and Place:	MWF 9:00–9:50 PM, Room 5102, Engr I	
Textbooks:	No official text, just lecturer notes See bibliography for other texts that may be helpful	
Grading:	Homework	70%
	Final exam	20%
	Class Participation	10% (ie. intelligent questions, attentiveness, ...)
Office Hours:	by appointment	
Reader:	Anyone interested?	
