

COURSE OUTLINE

**INSTRUCTOR:** Prof. Victor Pasko  
211B EE East, 865-3467, vpasko@psu.edu  
Office hours: MTW 9:00-10:00A

**LECTURES:** MWF 11:15A-12:05P 119 Earth-Engineering Sciences (EES) Building

**WEB SITE:** Available on Penn State's Course Management System (ANGEL) at <http://cms.psu.edu>

**DESCRIPTION:** Electromagnetic field theory fundamentals with application to transmission lines, waveguides, cavities, antennas, radar, and radio propagation.

**TEXTBOOK:** Constantine A. Balanis, ADVANCED ENGINEERING ELECTROMAGNETICS, John Wiley & Sons, 1989, 1008 pages, ISBN 0-471-62194-3.

**REFERENCES:** Zahn, M., ELECTROMAGNETIC FIELD THEORY: A Problem Solving Approach, Orig Ed., 1979, Reprint Ed. Krieger Publishing Company, 1987.

(on reserve at  
Engineering  
Library)

Ramo, S., J. R. Whinnery, T. Van Duzer, FIELDS AND WAVES IN COMMUNICATION ELECTRONICS, John Wiley & Sons, 3<sup>rd</sup> edition, 1994.

Jackson, J. D., CLASSICAL ELECTRODYNAMICS, John Wiley & Sons, 3<sup>rd</sup> edition, 1999.

**PREREQUISITE:** EE 430 or consent of instructor.

**HOMEWORK:** Assigned every week and must be submitted to the homework collection slot (121 EE East) on the indicated due date before 4 PM. The solutions of the homework will normally be posted on EE 531 web site on the morning after the assignment is due. The graded work should normally be returned to you one week after it is collected.

**LATE POLICY:** Each student is allowed to turn in one homework (of their choice) late during the semester.

**EXAMS:** Tentatively two take-home midterms (to be worked alone and due in 24 hours).

**PROJECT:** A class project (TBD) will be assigned after Thanksgiving Holidays and will be due before 4 PM on Friday, December 9. A background in numerical methods or programming is generally not needed (but would be helpful). Proficiency in Matlab is required. If you are not already familiar with Matlab, do not waste time! Spend some time with Matlab beginning the first week of the semester. Matlab will also be needed to solve some of the homework problems.

**GRADING:** Tentatively set at 25% homework, 25% each of two midterms and 25% class project.

**GRADER:** TBD

CONTENT:

Chapter	Topic	Lectures
1	Time-varying and time-harmonic electromagnetic fields	2
2	Electrical properties of matter	3
3	Wave equation and its solutions	3
4	Wave propagation and polarization	3
5	Reflection and transmission	3
	(Midterm exam #1, issued TBD, due TBD)	
6	Vector potentials, and radiation and scattering equations	8
7	Electromagnetic theorems and principles	5
8	Rectangular cross-section waveguides and cavities	3
	(Midterm exam #2, issued TBD, due TBD)	
11	Scattering	6
12	Integral equations and the moment method	5
14	Green's functions	3
Total lectures		<u>44</u>