

Syllabus

Fall 2009

EE30348 Electromagnetic Fields and Waves I

Instructor: Alan Seabaugh

Teaching Assistant: Lai Wei, lwei1@nd.edu

Class: Tuesdays and Thursdays, 11-12:15, O'Shaughnessy Hall 118

Recitation: Mondays, 4:05-4:55 pm, DeBartolo Hall

Website: Concourse

Textbook: Electromagnetic Fields and Waves, by Magdy F. Iskander,
Waveland Press, 1992, ISBN 1-57766-115-X

Description: This course teaches the fundamentals of electromagnetic field theory as encapsulated by Maxwell's equations. Vector analysis is employed extensively. Applications are everywhere.

Homework: Homework will be due on Tuesdays at the beginning of class. Late homework will be accepted only under extraordinary circumstances.

Office hours: by appointment, 230A Fitzpatrick Hall

Grading: Homework (10%), exams (3 x 20%), final exam (30%)

Objectives: Students will solidify their understanding of the laws of electromagnetism. The class will show the embodiment of these laws in modern electronic systems and devices and how the laws limit design.

EE30348 Plan

Lectures			Sections	Pages
25-Aug	1	Introduction - vectors and fields	1.1-1.3	1-15
27-Aug	2	Mathematical framework	1.4-1.5	16-26
1-Sep	3	Electric and magnetic fields	1.6	27-44
3-Sep	4	Vector integration	1.7	45-57
8-Sep	5	Maxwell's equations in integral form	1.8	58-70
10-Sep	6	Displacement current	1.9-1.10	71-85
15-Sep	7	Vector differentiation and gradients	2.1-2.3	99-109
17-Sep	8	Divergence theorem	2.4-2.6	110-125
22-Sep	9	Curl of a vector field and Stoke's theorem	2.7-2.8	126-138
24-Sep	Exam 1			
29-Sep	10	Ampere and Faraday's law	2.9-2.11	139-149
1-Oct	11	Continuity and wave equations	2.12-2.14	150-161
6-Oct	12	Wave propagation and polarization	2.14-2.15	162-170
8-Oct	13	Conductors	3.1-3.4	179-189
13-Oct	14	Dielectrics and Gauss' law	3.4-3.6	189-203
15-Oct	15	Magnetization currents	3.7-3.8	203-218
20-Oct	FALL BREAK			
22-Oct	FALL BREAK			
27-Oct	16	Bounded electromagnetics	3.9	218-231
29-Oct	17	Wave propagation in media	3.10-3.11	231-248
3-Nov	Exam 2			
5-Nov	18	Electromagnetic power and Poynting's theorem	3.12	248-263
10-Nov	19	Electrostatic fields and electrostatic potential	4.1-4.4	273-284
12-Nov	20	Capacitance and energy density	4.5-4.6	284-295
17-Nov	21	Laplace and Poisson's equation	4.7-4.8	296-313
19-Nov	22	Numerical solutions	4.9-4.10	313-327
24-Nov	23	Magnetic vector potential	4.10.	327-343
26-Nov	THANKSGIVING			
1-Dec	24	Magnetic circuits	4.11	332-344
3-Dec	25	Inductance	4.12-4.13	344-358
8-Dec	EXAM 3			
10-Dec	Wrap-up and special topics			