Syllabus Fall 2010

EE30348 Electromagnetic Fields and Waves I

Instructor: Alan Seabaugh

Teaching Assistants: Selam Nida snida@nd.edu and Ding Nie ding.12@nd.edu

Class: Tuesdays and Thursdays, 11-12:15, 356 Fitzpatrick Hall

Recitation: Mondays, 4:05-4:55 pm, 312 DeBartolo Hall

Website: Concourse will be used to track grades, post homework solutions, and provide supplementary material

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

Description: This course teaches the physics and applications of electromagnetic field theory as encapsulated in the vector form of Maxwell's equations. The class will show how these laws govern the design and bound the performance of electronic devices, circuits, and systems

Objectives: Students will develop a physical understanding of electromagnetic fields and waves to unify their understanding of electricity, magnetism, and light. Big aims are to teach engineers to innovate and make informed decisions related to the development of safer, energy-efficient, and sustainable technologies and systems.

Homework: Homework will be due on Tuesdays at the beginning of class. Late homework will be accepted only under extraordinary circumstances. Open discussion of homework is encouraged, but students must turn in their own work. Assigned readings are to be completed prior to class on the date listed. A reading discipline of 4 pages per day will enable completion of the readings.

Office hours: TBD, 230A Fitpatrick Hall, stop in or make an appointment with Heidi Deethardt hdeethar@nd.edu, 631-0279

Class Participation: In class questions will be used to gauge mastery of readings and concepts. To be exempt from questions in a given class, send an email message with PASS in the subject line prior to class. Each student can use up to two passes in the semester.

Grading: Homework (15%), class participation (5%), exams (3 x 20%), final exam (20%)

Final Exam: Monday, December 13, 10:30-12:30 pm

EE30348 Schedule

Lectures			Sections	Pages
24-Aug	1	Introduction		
26-Aug	2	Vectors and coordinate systems workshop	1.1-1.3	1-15
31-Aug	3	Vector fields and coordinate transformations	1.4-1.5	16-26
2-Sep	4	Electric and magnetic fields	1.6	27-44
7-Sep	5	Vector integration	1.7	45-57
9-Sep	6	Maxwell's equations in integral form	1.8	58-70
14-Sep	7	Displacement current	1.9-1.10	71-85
16-Sep	8	Maxwell's equation in differential form	2.1-2.3	99-109
21-Sep	9	Divergence theorem	2.4-2.6	110-125
23-Sep		Exam 1		
28-Sep	10	Curl of a vector field and Stoke's theorem	2.7-2.8	126-138
30-Sep	11	Ampere and Faraday's law	2.9-2.11	139-149
5-Oct	12	Continuity and wave equations	2.12-2.14	150-161
7-Oct	13	Wave propagation and polarization	2.14-2.15	162-170
12-Oct	14	Conductors	3.1-3.4	179-189
14-Oct	15	Dielectrics and Gauss' law	3.4-3.6	189-203
19-Oct		FALL BREAK		
21-Oct		FALL BREAK		
26-Oct	16	Magnets and magnetization	3.7-3.8	203-218
28-Oct	17	Exam 2		
26-Oct	16	Electromagnetic fields at material boundaries	3.9	208-231
4-Nov	18	Wave propagation in media	3.10-3.11	231-248
9-Nov	19	Electromagnetic power and Poynting's theorem	3.12	248-263
11-Nov	20	Electrostatic fields and electrostatic potential	4.1-4.4	273-284
16-Nov	21	Capacitance and energy density	4.5-4.6	284-295
18-Nov	22	Laplace and Poisson's equation	4.7	296-300
23-Nov	23	Magnetic vector potential	4.10.	323-332
25-Nov		THANKSGIVING		
30-Nov	24	Magnetic circuits	4.11	332-344
2-Dec	25	Inductance	4.12-4.13	344-358
7-Dec		EXAM 3		
9-Dec		Wrap-up		