Applied Electromagnetic (10410MS 406100), 2015F

Class Time: W7W8W9

Class Room: B09, Bldg. Delta,

Instructor: Ta-Jen Yen (嚴大任)
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Textbooks: Fundamentals of Applied Electromagnetics (5th edition), *Fawwaz T. Ulaby*, 東華書局

Grading: Homeworks & Quizzes (25%)
Midterms (x2, 50%)
Final (25%)

TAs: Olivia (江叡涵): olivia30127@gmail.com

TA Hours: B09, Bldg. Delta,7 pm, Mondays,

Content:

The subject of ***Applied Electromagnetics*** plays a fundamental role in science, technology, and society. The rich content of this subject covers various aspects, and is usually delivered within two semesters, not one semester as we plan to do. Herein, we manage to introduce the most demanded thrusts within one semester, starting from electrostatics and magnetostatics. Next, we advance to dynamic cases, and lead to Maxwell equations, the cornerstone of Electromagnetics. The following parts are plane-wave propagation, polarization, wave reflection/transmission, and some novel progress in modern electromagnetics. In addition to the propagation waves, we will also show you the guided and confined waves, and their counterpart of transmission lines. The last part of this course deals with principles of radiation by currents in wires, which then enable practical devices of antennas. Notice that all lectures and tests are given by English. Finally, with these well-organized thrusts aforementioned, I hope you enjoy the journey of ***Applied Electromagnetics*** through this semester.

Class Schedule of Applied Electromagnetics (2015F)

Week	Date	Chapters	Content
1	9/16	**Electrostatics**	syllabus, quick review of vector analysis, charge and current distributions,
			Coulomb's law, Gauss's law, electric scalar potential, electric dipole
2	9/23		conductors, dielectrics, electric boundary conditions (BCs), electrostatic potential energy
		Magnetostatics	Biot-Savart law, Maxwell's magnetostatic equations (Gauss's & Ampere's laws)
3	9/30		vector magnetic potential, magnetic BCs, inductance, magnetic energy
		Maxwell's equations for time-varying fields	Faraday's law, transformer & generator
4	10/7		dispalcement current, BCs for electromagnetics
			charge-current continuty, electromagnetic potentials
5	10/14	**Plane-Wave Propagation (1/2)**	time harmonic fields, wave equations
			complex permittivity and Drude-Lorentz model
6	10/21	**Midterm #1**	
7	10/28	**Plane-Wave Propagation (2/2)**	Mie theory
			wave propagation in lossless and lossy media, electromagnetic power density
8	11/4	**Polarization**	wave polarization
			Mueller's matrix
9	11/11	**Wave Refelction and Transmissin**	Snell's law (also Fermat's principle), Fiber optics
			Fresnel equations, transfer matrix
10	11/18	**運動會**	
11	11/25	**Novel Phenomena**	negative refractive index media (NRIM)
			surface plasmon polaritons (SPPs)
12	12/2	**Midterm #2**	
13	12/9	**Guided and Confined Waves**	planar conductors
			conducting tubes
14	12/16		dielectric waveguides
		Transmission Lines	lumped-element model, transmission line equations
15	12/23		wave propagation on a TL, lossless TL
			Smith chart
16	12/30		impedance matching
		Radiation and Antennas	the short dipole
17	1/6		antenna radiation charcteristics
			half-wavelength dipole antenna
18	1/13	**Final exam**	

This schedule is subject to being adjusted upon actual intruction progess and students' feedback.