Applied Electromagnetic (10910MS 506100), 2020F

Class Time: F5F6F7

Class Room: B09, Bldg. Delta

Instructor: Ta-Jen Yen (嚴大任)
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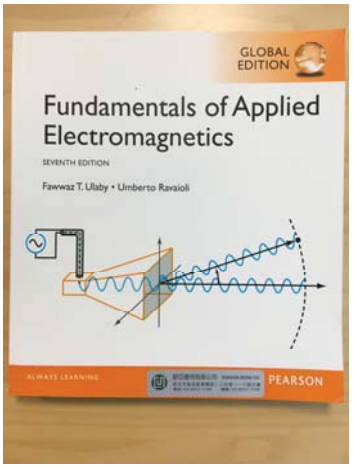
Textbooks: Fundamentals of Applied Electromagnetics (7th edition), *Fawwaz T. Ulaby & Umberto Ravaioli*, 歐亞書局



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

TAs: TBA

TA Hours: TBA

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 transmission lines. Next, we move to electrostatics and magnetostatics, then advance to dynamic cases, and finally 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 (in the very beginning). 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. With these well- organized thrusts aforementioned, I hope you enjoy the journey of ***Applied Electromagnetics*** through this semester.

Class Schedule of Applied Electromagnetics (2020F)

Week	Chapters	Content
1	**Syllabus**	Syllabus, transmission line, lumped-element model, transmission line equations
2	**Transmission Line**	wave propagation on a TL, lossless TL, wave impedance, power flow on a lossless TL
3		Smith chart, impedance matching
4	**Electrostatics**	vector analysis, MEs, charge/current distributions, Coulomb's/Gauss's laws, electric scalar potentials
5		conductors, dielectrics, electric boundary conditions (BCs), electrostatic potential energy
6	**Midterm #1**	
7	**Magnetostatics**	magnetic force, Biot-Savart law, Gauss's & Ampere's laws, vector magnetic potential, magnetic BCs
8		inductance, magnetic energy
9	**Maxwell's equations for time-varying fields**	Lentz's law, Faraday's law, transformer & generator, dispalcement current, BCs for electromagnetics
10		charge-current continuty, free charge dissipation, electromagnetic potentials
11	**Plane-Wave Propagation**	time harmonic fields, wave equations, wave propagation in lossless/lossy media, wave polarizations
12	**Midterm #2**	
13	**Plane-Wave Propagation**	electromagnetic power density, complex permittivity and Drude-Lorentz model, Mie theory
14	**Wave Refelction and Transmissin**	Snell's law (also Fermat's principle), Fiber optics, Fresnel equations, Brester angles
15		wave guides, conducting tubes (WG)
16	**Novel topics**	surface plasmon polaritons (SPPs), negative refractive index media (NRIM)
17	**Radiation and Antennas**	short dipole, antenna radiation charcteristics
18	**Final**	

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