

ECE 107 – Electromagnetism (Spring 2010) Syllabus:

Ch. 1. Waves and Phasors – 1 lecture

- Pages 12-38, electric and magnetic fields, waves, complex numbers, phasors

Ch. 2. Transmission Lines – 5 lectures

- Pages 48-58, lumped element model, transmission line equations
- Pages 65-76, propagation, reflection coefficient, wave impedance

- Pages 80-87, special cases of lossless lines, power flow
- Pages 88-99, the Smith chart
- Pages 100-110, impedance matching

Ch. 3. Vector Analysis – 2 lectures

- Pages 131-150, vectors, orthogonal coordinate systems, transformations
- Pages 151-167, gradient of scalar field, divergence, curl, Stoke's theorem, Laplacian operator
- **Midterm exam covering chapters 1-3**

Ch. 4. Electrostatics – 3 lectures

- Pages 178-187, Maxwell's equations, charge and current distributions, Coulombs law, Gauss's law
- Pages 188-202, electric potential, conductors, dielectrics
- Pages 203-219, electric boundary conditions, capacitance, electrostatic potential energy, image method

Ch. 5. Magnetostatics – 3 lectures

- Pages 236-248, magnetic forces, Biot-Savart law
- Pages 249-258, magnetostatic equations, Ampere's law, vector magnetic potential
- Pages 259-269, magnetic materials, boundary conditions, inductance, magnetic energy

- **Midterm exam covering chapters 4, 5**

Ch. 6. Maxwell's Equations for Time Varying Fields – 3 lectures

- Pages 282-292 Faraday's law, transformers
- Pages 293-300 generators, displacement current

- Pages 301-307, boundary conditions, continuity, potentials

Ch. 7. Plane Wave Propagation – 3 lectures

- Pages 314-322, time harmonic fields, propagation in lossless media
- Pages 323-333 polarization

- Pages 334-343, propagation in lossy media, current flow in conductors, power density

- **Midterm exam covering chapters 6, 7**

Ch. 8. Wave Reflection and Transmission – 4 lectures

- Pages 351-363, electromagnetic waves at boundaries, Snell's laws, optical fibers

- Pages 366-375, reflection and transmission at oblique incidence
- Pages 378-389, waveguides, resonators

Ch. 9. Radiation and Antennas – 3 lectures

- Pages 402-407 antennas, Hertzian dipole

(no class Monday)

- Pages 408-414 antenna characteristics
- Pages 415-425 half wave dipole, effective area, Friis transmission formula

Final exam covering chapters 1-9