Course Outline

1. Green’s Functions
   (a) basics of distribution theory
   (b) boundary value problems for second order equations
   (c) transmission lines – Sturm-Liouville problems
      - Green’s functions in closed form
      - Green’s functions in series form
   (d) generalized Green’s function method
   (e) Green’s functions for the scalar Helmholtz equation
      - rectangular waveguides
   (f) dyadic Green’s functions

2. Scattering
   (a) sources of cylindrical waves
   (b) cylindrical wave transformations
   (c) scattering by cylinders and wedges
   (d) spherical wave transformations
   (e) scattering by spheres

3. Plane Layered Media
   (a) reflection and transmission in multilayered media
   (b) spectral representation of sources
      - line source
      - point source
   (c) Riemann sheets and branch cuts
   (d) asymptotic expansions of integrals
      - stationary phase
      - saddle point method
      - uniform asymptotic expansions
   (e) asymptotic expansions for a dipole over layered media
      - vertical magnetic dipole
      - vertical electric dipole
      - dipole over a slab
   (f) numerical integration of Sommerfeld integrals

4. Perturbation and Variational Techniques
   (a) perturbation of cavity walls
   (b) waveguide perturbations
   (c) reciprocity and reaction
   (d) stationary formulas for impedance
   (e) stationary formulas for resonators

Reference texts:


Other reference texts, and course notes and handouts from other sources will be used as well.