

Tentative Course Plan

- L1 Introduction
- L2 Potential, Gauss Law, Poisson Equation
- L3 Multipole Expansion, Spherical Harmonics
- L4 Uniqueness Theorem
- L5 Green's Function, Image Charge
- L6 Expansion of Green's function in terms of Eigenfunctions
- L7 Solving the Laplace Equation
- L8 Electromagnetic Energy, Stress Tensor
- L9 Electrostatics in Matter, Induced Fields
- L10 Ampère's Law, Gauge Potential
- L11 Magnetic Multipoles, Magnetic Fields in Matter
- L12 Faraday's Law
- L13 Magnetic Energy, Energy in Circuits, Momentum Tensor
- L14 Diamagnetism, Para magnetism, Permanent Magnets
- L15 Maxwell Equations, Displacement Current
- L16 Maxwell Equations in Matter, Boundary Conditions
- L17 Forces between Charges and Currents, Momentum, Energy
- L18 Wave Equation, Plane Waves
- L19 Reflection and Refraction
- L20 Snell's Law, Brewster Angle
- L21 Midterm
- L22 Coulomb Gauge, Lorentz Gauge, Green's Function
- L23 Advanced and Retarded Green's Function
- L24 Radiation by Slowly Moving Charges
- L25 Quadrupole Radiation, Selection Rules
- L26 Definitions in Special Relativity
- L27 Proper Time, Lorentz Transformations
- L28 Addition of Velocities, Four Vectors
- L29 Lorentz Group, Infinitesimal Generators
- L30 Invariant Tensors, Dual Tensor
- L31 Four Velocity, Action, Momentum, Force
- L32 Lagrangian of Maxwell Equations
- L33 Elastic Collisions, Decay and Fusion of Particles, Invariant Cross Section
- L34 Center of Mass Frame, Angular Momentum
- L35 Four Current, Four Potential, Lagrangian
- L36 Motion in Constant \vec{E} and \vec{B} , Covariant Maxwell Equations
- L37 Helicity and Angular Momentum
- L38 Vector and Scalar Potentials, Gauge Invariance
- L39 Green's Function, Radiation
- L40 Physical Radiation Fields, Radiation by slowly moving Charges
- L41 Larmor Formula, E1, E2 and M1 Radiation
- L42 Lienard-Wiechert Fields,