APh 150 Special Topics in Applied Physics - Introduction to Nanophotonics 3-0-6 Spring 2013
Instructor: Harry A. Atwater Prerequisite or concurrent: Physics 106, Physics 125

An introductory survey of nanophotonics topics including Helmholtz and Maxwell equations, complex dielectric function, propagating and evanescent fields in complex dielectric media, frequency dispersion and dispersion relations, spatial dispersion, radiation from dipole and multipole sources, dipole-dipole interactions, optical response of metals and dielectrics, localized surface plasmons, energy localization and hot spots, surface plasmon polaritons, phonon polaritons, local electromagnetic fields near nanostructures, the local density of optical states, light propagation in periodic and resonant structures: cavities, photonic crystals, metamaterials and optical antennas; optical resolution, point-spread function; introductory quantum electrodynamics, Casimir effect, spontaneous emission, spontaneous scattering, Purcell effect; computational methods for nanophotonics: finite element integration, finite difference time domain, boundary element method, rigorous coupled wave analysis.