APh/EE 131 Optical Wave Propagation
Prof. Bruno Crosignani

1. Macroscopic Maxwell equations – Constitutive relations – Monochromatic and non-monochromatic plane-wave propagation, analytic signal – Chromatic dispersion – Kramers-Kronig relations - Group velocity and group velocity dispersion - Pulse spreading in dispersive media
2. Polarization states – Linear, circular and elliptical polarization – Jones vectors and Stokes parameters
3. Propagation in anisotropic homogeneous media – Plane waves in uniaxially anisotropic media
4. Elementary theory of coherence - Coherence time - Coherence length
5. Free and guided em wave propagation – Gaussian Beams
6. Fabry-Perot etalon – Fabry-Perot etalon as a spectrum analyzer - Optical resonators with spherical mirrors
7. Dielectric waveguides and optical fibers
8. Coupled-mode theory – Wave propagation in periodic media
9. Macroscopic and microscopic approach to scattering theory – The scattering field as a stochastic variable - Angular and frequency spectrum of scattered light – Quasi elastic scattered light by small particles – Scattering by particles undergoing Brownian motion
10. Nonlinear optics – Third-order nonlinearity – Spatial and temporal Kerr solitons – Photorefractive solitons