Physics 325 Syllabus Summer 2017

Review of Waves, including Fourier analysis
Review of electric and magnetic fields, Maxwell’s equations

Reflection and refraction - Fresnel equations
Rainbow and other atmospheric phenomena
Lens and mirror calculations.
Thick lenses
Aberrations and how to minimise them
Basic instruments such as telescope, microscope, camera, eye, etc
Speed of light
Interference. Double slit. Diffraction grating
Spectroscopy
Thin film interference. Interference filters.
Fraunhofer diffraction. Resolving power.
Fresnel diffraction. Zone plate, Cornu spiral
Scattering. Thomson and Rayleigh.
Polarization - by reflection (Brewster angle etc), scattering, dichroism, selective absorption
Birefringence.
Interference of polarized light. Half-wave plates, etc
Stokes parameters.
Mueller matrices.
Poincaré sphere.
Optical activity
Faraday effect

Plus, if time, one or two selected topics from

Adaptive optics
Modern telescope design
Modern microscope design
Electro-optic phenomena
Lasers
Holography
Schlieren optics
Speckle interferometry,
Fibre optics