

## 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