Optical engineering spring quarter 2018

This class covers both the fundamentals of optical engineering and the development of space optical systems. Emphasis is on the design and engineering of optical, UV and IR systems for scientific remote sensing and imaging applications.

Material covered is: first order optics to find the location, size and orientation of an image; geometrical aberration theory & balancing & tolerancing optical systems; transmittance, Etendu & vignetting; radiative transfer; scalar & vector wave propagation – physical optics; scalar diffraction & image formation & coherence; interferometry for the measurement of optical surfaces & astronomy; optical metrology & wavefront sensing & control (A/O); segmented and sparse aperture telescopes; and design topics in coronagraphy, Fourier transform spectrometers, grating spectrometers, and large aperture telescopes.

Space optics issues discussed will be segmented & sparse aperture telescopes, radiation damage to glass, thermal and UV contamination.

Grades are based on about five take-home homework problem sets and a term paper on a case study of an instrument of mutual interest to the student and the professor.

Textbook: J. B. Breckinridge (2012) **Basic Optics for the Astronomical Sciences**, SPIE press

Dr. Breckinridge spent 34 years at JPL, where he led the optical sciences and application section. Before coming to JPL, he worked at Lick Observatory, Kitt Peak National Observatory, and the College of Optical Sciences at the U of A. He has taught optics at Caltech for over 20 years. He holds his BSc in physics from Case and MSc & PhD from the University of Arizona and has over 70 peer-reviewed publications in physical optics, astronomy, optical design & engineering.

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