nuclei (e.g., Sesar et al. 2007). Optical variability is one method for identifying quasars[1] (e.g., Eyer 2002; Geha et al. 2003; Rengstorf et al. 2004), although it is only recently that a fully quantitative approach to variability selection has been developed (Kozłowski et al. 2010).

The emission from quasars generally has three components. The UV to near-IR radiation is dominated by a hot accretion disk extending from an inner edge of a few gravitational radii from the black hole outward with, in simple thin disk theory, a temperature profile $T \propto R^{-3/4}$ (Shakura & Sunyaev 1973). Near the inner edge, there is a corona of hotter gas that produces the non-thermal X-ray emission (Haardt et al. 1994). On scales where the temperature is below the dust sublimation temperature ($\sim$ 2000 K), dust absorbs radiation from the disk and reradiates the energy in the mid-IR and far-IR (Barvainis 1987). The overall spectrum typically shows a minimum near 1 μm, with the emission from the disk rising toward the UV and the emission reradiated by dust rising toward the far-IR (e.g., Sanders et al. 1989). There is an increasing evidence that many physical relations between AGNs, galaxies and their large scale clustering have to be taken into account if their formation and evolution is to be understood (e.g., Tasse et al. 2008).

We know a great deal about the optical variability of quasars both from large studies of the variability seen in ensembles of sparsely monitored quasars and from detailed studies of individual quasars. Ensemble studies (e.g., Vanden Berk et al. 2004; de Vries et al. 2005) have shown that variability increases with decreasing optical wavelength, decreasing luminosity, and potentially decreasing black-hole mass. The structure function of the ensemble variability is a power law with smaller variability amplitudes on short timescales, with some evidence for saturation on timescales of order a few decades. Until recently, there were few studies of individual quasars (e.g., Cutri et al. 1985; Clavel et al. 1989; Hook et al. 1994), but this has changed dramatically in the last year. The light curves of individual quasars are well modeled by a damped random walk, a stochastic process described by the amplitude of the random walk and a damping timescale for returning to the mean luminosity (Kelly et al. 2009; Kozłowski et al. 2010; MacLeod et al. 2010). While preliminary indications from Kelly et al. (2009), based on $\sim$ 100 quasars, suggest that these two process parameters are related to the quasar luminosity and black hole mass, MacLeod et al. (2010) used $\sim$ 9000 Sloan Digital Sky Survey (SDSS) Stripe 82 quasars to find a number of clear trends. For example, the asymptotic variability on long timescales decreases with increasing luminosity and rest-frame wavelength, and is correlated with black hole mass. The timescale for returning to the mean luminosity increases with wavelength and also with increasing

[1] We will use words "quasar" and "AGN" interchangeably throughout this paper.