Title: Uniform in time approximations: Averaging

Abstract: A popular way of reducing the dynamics of multiscale systems to be more amenable in the setting of SDEs (as well as ODEs and PDEs) is through the method of averaging, and the talk will begin with a very brief overview of this. Historically, averaging is known to provide a good approximation to the fully coupled system over finite time horizons. I will consider a fully coupled system of SDEs where the 'fast' component is ergodic, and discuss our result which gives sufficient conditions such that the approximation obtained through the method of averaging provides a good approximation of this system across all times. That is, the distance between the averaged system and the fully coupled system is bounded uniformly in time. One important tool used is semigroup derivative estimates. The bulk of the talk will be in motivating these estimates as a way of obtaining uniform in time bounds.