

TEMPLE UNIVERSITY

Department of Mathematics

Analysis Seminar

Room 617 Wachman Hall

Monday February 3, 2020, 2:40 p.m.

*Rates of convergence to statistical equilibrium:
a general approach and applications*

by Cecilia Freire Mondaini

Drexel University

Abstract: This talk focuses on the study of convergence/mixing rates for stochastic dynamical systems towards statistical equilibrium. Our approach uses the weak Harris theorem combined with a generalized coupling technique to obtain such rates for infinite-dimensional stochastic systems in a suitable Wasserstein distance. In particular, we show two scenarios where this approach is applied in the context of stochastic fluid flows. First, to show that Markov kernels constructed from a suitable numerical discretization of the 2D stochastic Navier-Stokes equations converge towards the invariant measure of the continuous system. This depends crucially on a spectral gap result for the discrete Markov kernel that is independent of the level of discretization. Second, to approximate the posterior measure obtained via a Bayesian approach to inverse PDE problems, particularly when applied to advection-diffusion type PDEs. In this latter case, the Markov transition kernel is constructed with an exact preconditioned Hamiltonian Monte Carlo algorithm in infinite dimensions. A rigorous proof of mixing rates for such algorithm was an open problem until quite recently. Our approach provides an alternative and flexible methodology to establish mixing rates for other Markov Chain Monte Carlo algorithms. This is a joint work with Nathan Glatt-Holtz (Tulane U).