



**The Center for Control, Dynamical Systems, and Computation
University of California at Santa Barbara
Winter 2010 Seminar Series
Presents**

Spectral Theory and Model Reduction for Markov Models

**Sean Meyn
Department of Electrical and Computer Engineering
University of Illinois**

Friday, January 8, 2009, 3:00 – 4:00pm CHEM 1171

Abstract: We survey recent approaches to model reduction for Markov models based on spectral theory. The approximating process is described as a hidden Markov model (HMM) with finite state space. These approximations are possible under a Lyapunov drift condition introduced by Donsker-Varadhan in their treatment of large deviations for diffusions. In the special case of diffusions, we find that eigen functions provide a decomposition of the state space into “almost invariant” sets. The diffusion mixes rapidly in each of these subsets prior to exiting, and the exit time from one of these sets is approximately exponential.

About the Speaker: Sean Meyn received the B.A. degree in Mathematics Summa Cum Laude from UCLA in 1982 and the PhD degree in Electrical Engineering from McGill University in 1987 (with Prof. P. Caines, McGill University). After a two year postdoctoral fellowship at the Australian National University in Canberra, Dr. Meyn and his family moved to the Midwest. He is now a Professor in the Department of Electrical and Computer Engineering, and a Research Professor in the Coordinated Science Laboratory at the University of Illinois. He is also an IEEE fellow. He is coauthor with Richard Tweedie of the monograph Markov Chains and Stochastic Stability, Springer-Verlag, London, 1993, and received jointly with Tweedie the 1994 ORSA/TIMS Best Publication in Applied Probability Award. The 2009 edition is published in the Cambridge Mathematical Library. His new book, Control Techniques for Complex Networks is published by Cambridge University Press. He has held visiting positions at universities all over the world, including the Indian Institute of Science, Bangalore during 1997-1998 where he was a Fulbright Research Scholar. During his latest sabbatical during the 2006-2007 academic year he was a visiting professor at MIT and United Technologies Research Center (UTRC). His research interests include stochastic processes, control and optimization, complex networks, and information theory. Current funding is provided by NSF, Dept. of Energy, AFOSR, and DARPA.
