BI-CO MATHEMATICS COLLOQUIUM

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"Markov Chain Monte Carlo: A Course for Math Majors"

Monday, April 14, 2008
Tea at 4:00 p.m. – Math Lounge, KINSC H208
Talk at 4:15 p.m. – KINSC Hilles 109

Abstract: Markov Chain Monte Carlo (MCMC) is a simulation method that has been transforming the practice of statistics. MCMC also has much to recommend it as a topic for an undergraduate mathematics course. A major goal of the course as I teach it is to show how authentic applied problems can give rise to mathematics for its own sake. In my talk I'll show how problems involving organization of ecological communities, counting of political killings in Kosovo, locating binding sites on large molecules, and evaluating the effectiveness of designated bike routes lead to random walks on graphs, convergence in measure, and spectral decomposition of matrices. Along the way, students are introduced to classical hypothesis testing and Bayesian posterior distributions. The course, whose only prerequisite is matrix algebra, has been taught three times at Mount Holyoke, and once each at Villanova and Grinnell.

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