

**Stanford University**  
**Department of Statistics**

DEPARTMENTAL SEMINAR

4:30pm, Tuesday, February 5, 2019  
Sloan Mathematics Center Room 380C

Refreshments served at 4pm in Sequoia Lounge.

**Speaker:** Brett Kolesnik, *UC Berkeley*

**Title:** **Randomized sequential importance sampling for estimating the number of perfect matchings in bipartite graphs**

**Abstract:**

Sequential importance sampling is a widely used technique for Monte Carlo evaluation of intractable counting and statistical problems. Matchings have seen a huge resurgence due to their appearance in, for example, donor matching of organ transplants and ride sharing à la Lyft/Uber where drivers are matched with customers. While there are efficient methods for determining if a bipartite graph has a perfect matching, counting the number of perfect matchings is a difficult problem in general.

In this talk, we introduce novel randomized sequential importance sampling algorithms for estimating the number of perfect matchings in bipartite graphs. A key to evaluating the efficiency of these algorithms is limit theory for random variables satisfying distributional recurrence relations of divide-and-conquer type. For various test graphs, our importance sampling algorithms outperform the celebrated polynomial Markov chain Monte Carlo algorithms of Jerrum, Sinclair and Vigoda within a range of interest. We think our methods should also be useful for a variety of applied problems, such as counting and testing for contingency tables and graphs with given degree sequence.

This is joint work with Persi Diaconis.