



The University of Chicago  
Department of Statistics

Seminars for Fourth Year PhD Students

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**Kriging Prediction with Estimated Covariances**

**Wednesday, November 1, 2006 at 4:30 PM**  
**110 Eckhart Hall, 5734 S. University Avenue**

### **ABSTRACT**

Under the setting of a Gaussian random field, we study the effect of using estimated covariances on the inferences based on the kriging predictor. When the covariances are known, the standardized kriging prediction error follows the standard normal distribution. When, as is often the case, the covariances are unknown, it has been a standard way to use a simple plug-in procedure where certain estimates for the covariances are substituted for the true covariances and inferences are made based on the assumption that the resulting plug-in estimate of the standardized prediction error asymptotically follows the standard normal distribution. However, in the finite sample case or under fixed-domain asymptotics, the effect of estimation may not be negligible, which requires appropriate adjustments to be made to the procedure. As alternatives to the normal approximation, we provide two plausible approximations that take into account such an effect both on the efficiency of the predictor and on the estimation of the mean squared prediction error. The two methods are numerically compared through a simulation study and real data. Analytic approaches including one involving the formal Edgeworth expansion are also considered in a hope to find a better alternative as well as to compare the two existing methods.