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Seminar

Speaker: **Dr. Scott Ferson**
Senior Scientist
Applied Biomathematics

Title**:** **Computing with confidence (figuratively and literally)**

Time: **3:20 – 4:20pm, *Wednesday*, September 10, 2014**

Place: **552 Hill Center**

Abstract

Confidence boxes ("c-boxes") are imprecise generalizations of traditional confidence distributions, which, like Student's t distribution, encode frequentist confidence intervals for parameters of interest at every confidence level. They are analogous to Bayesian posterior distributions in that they characterize the inferential uncertainty about distribution parameters estimated from sparse or imprecise sample data, but they have a purely frequentist interpretation that makes them useful in engineering because they offer a guarantee of statistical performance through repeated use. Unlike confidence intervals which cannot usually be used in mathematical calculations, c-boxes can be propagated through mathematical expressions using the ordinary machinery of probability bounds analysis, and this allows analysts to compute with confidence, both figuratively and literally, because the results also have the same confidence interpretation. For instance, they can be used to compute probability boxes for both prediction and tolerance distributions. Confidence boxes can be computed in a variety of ways directly from random sample data. There are c-boxes both for parametric problems (where the family of the underlying distribution from which the data were randomly generated is known to be normal, lognormal, exponential, binomial, Poisson, etc.), and for nonparametric problems in which the shape of the underlying distribution is unknown. Confidence boxes account for the uncertainty about a parameter that comes from the inference from observations, including the effect of small sample size, but also the effects of imprecision in the data and demographic uncertainty which arises from trying to characterize a continuous parameter from discrete data observations.

***** Refreshments will be served @2:50pm in Room 502 Hill Center *****