

DEPARTMENT OF STATISTICS AND BIOSTATISTICS

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Accurate inference using higher order asymptotics: A univariate calibration problem and a multivariate bioassay problem

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3:20 – 4:20pm

Light refreshments will be served

**110 Frelinghuysen Road
Hill Center, Room 552**

Abstract: In this talk, I will discuss two problems where accurate inference is obtained using higher order inference. The first problem is on a measurement error model in analytical chemistry, proposed by Rocke and Lorenzato (1995, Technometrics), meant to capture the increasing response variation that is expected with increased concentration of an analyte, and a near-constant variability at very low levels of the analyte. The problem of interest is one of calibration; i.e., the estimation of an unknown concentration of the analyte after obtaining the corresponding response. A modified likelihood methodology that exhibits higher order accuracy is shown to perform very well in a small sample size scenario, and is illustrated using an example. The second problem deals with independent multivariate bioassays performed at different laboratories or locations, and the problem is that of testing the homogeneity of the relative potencies, assuming the usual slope-ratio or parallel line assay model. The problem is investigated in the literature using likelihood-based methods, under the assumption of a common covariance matrix across the different studies. This assumption is relaxed in this investigation. Numerical results show that the usual likelihood-based procedure is inaccurate, in terms of providing inflated type I error probabilities, unless the sample sizes are large. Correction based on higher order asymptotic procedure is investigated, and this provides significantly more accurate results in the small sample scenario. The results are illustrated with an example.

Bio: Thomas Mathew earned his Ph.D. in statistics from the Indian Statistical Institute in 1983. He joined UMBC in the fall of 1985. His current research interests include statistical methodology for analyzing exposure data, calibration problems and tolerance regions, inference in linear mixed and random models, and univariate and multivariate bioequivalence testing. His research has been funded by the Air Force Office of Scientific Research, NSF, Army Research Office and NIH. He is a co-author of the Wiley book "Statistical Tests for Mixed Linear Models" and is currently completing a book on statistical tolerance regions.

