Department of Mathematical Sciences
Faculty and Graduate Research Colloquium

Thursday, October 30, 2025
1:00-1:50pm
RB 450

“Analytic Estimation of Missing Observations in Non-Replicated Factorial Experiments”
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Abstract:

Estimating multiple missing observations in factorial experiments is essential for preserving the integrity of statistical analysis, ensuring accurate interpretation of experimental effects, and maintaining the validity of conclusions. This study introduces a novel methodology for estimating two missing observations in non-replicated two-way factorial experiment data, addressing three distinct missingness scenarios. The proposed analytic estimators, derived through minimization of the squared error loss (L_2 norm), provide a robust and computationally efficient approach to estimating missing observations. The robustness of the methodology is further assessed via numerical optimization, confirming the stability of the derived solutions. Simulation studies conducted under varying replication levels (m) demonstrate that the proposed estimators yield consistent reductions in bias, variance, mean absolute error (MAE), and mean squared error (MSE) as m increases. Moreover, comparisons across missingness scenarios highlight the influence of specific missing-value patterns on estimator performance. Overall, the findings underscore the efficiency and adaptability of the proposed methodology, establishing a foundation for future extensions to replicated and higher-dimensional factorial designs.