The Hong Kong University of Science and Technology

Department of Mathematics

<u>Mathematics Colloquium</u>

Randomization-based causal inference from Split-plot designs

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<u>Abstract</u>
Despite "correlation does not imply causation" has become many statisticians' reflex response when confronted with causation-related discussions, Statistics, as a distinct academic discipline with 100+ years of history, has indeed randomized experiments and causal inference at the heart of its origin. The seminar aims to (1) provide a high-level overview of the fundamentals of causal inference from randomized experiments under the potential outcomes framework and to (2) introduce the work we have done along this line for finite-population inference from split-plot design — a distinct and hugely-valuable design type featuring the block structure of its experimental units. In addition to developing the very first randomization-based estimation procedure for causal inference from split-plot designs with demonstrated superior frequency coverage properties over existing methods, we defined two novel measures of unit heterogeneities under the potential outcomes framework and proposed a decomposition of potential outcomes covariances to link such heterogeneities to relative design efficiencies. The comparison and contrast we conducted for the proposed finite-population, randomization-based approach and its super-population, linear-model-based counterpart, on the other hand, constitutes the field's very first attempt to connect the perspectives and quantify the difference.

Date: **Thursday, 24 January 2019**

Time: **3:00 p.m. – 4:00 p.m.**

Venue: **Room 4504, Academic Building (near Lifts 25-26), HKUST**

All are welcome!