A/B Testing and Beyond:

Designed Experiments for Data Scientists

A Continuing Education Certificate Offered by The University of San Francisco's Data Institute

September 6 – October 18, 2018

Schedule of Topics

Week 1: Wednesday September 6th

- Introduction
  - Structured Problem Solving
  - Advantages and Disadvantages of Experimentation
  - Fundamental Design Principles: Replication, Randomization, Blocking
  - Statistical Prerequisites

Week 2: Wednesday September 13th

- A/B/n Testing Part I
  - Two-group comparisons
  - Hypothesis testing via *t*-tests, *z*-tests and χ^2-tests
  - Power analysis and sample size calculations

Week 3: Wednesday September 20th

- A/B/n Testing Part II
  - Multiple group comparisons
  - Hypothesis testing via *F*-tests and χ^2-tests
  - Multiple testing issues and the Bonferroni correction

Week 4: Wednesday September 27th

- Factorial Experiments
  - Efficient investigation of multiple factors
  - Design and analysis of full factorial experiments
  - Design and analysis of 2^k factorial experiments

Week 5: Wednesday October 4th

- Fractional Factorial Experiments
    - The importance of economically designed screening experiments
    - Design and analysis of 2^{k-p} fractional factorial experiments

Week 6: Wednesday October 11th

- Response Surface Methodology
    - Response optimization via Central Composite Designs
    - Multi-objective optimization via desirability functions

Week 7: Wednesday October 18th

- Multi-Armed Bandit Experiments
    - Exploration of the Bayesian alternative to standard hypothesis testing and A/B/n experiments