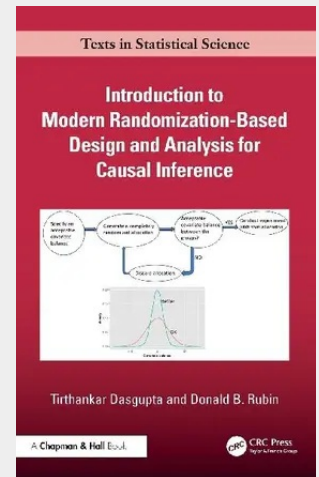


## Introduction to Modern Randomization-Based Design and Analysis for Causal Inference

Design of experiments is, in essence, a disciplined way to learn about cause and effect. Modern experiments can involve a few to millions of units and hundreds or thousands of covariates. These settings demand tools that are flexible, transparent, and faithful to the underlying design in order to reach reliable conclusions about which interventions work and which ones do not. This book provides a modern, accessible, and computationally supported introduction to experimental design grounded firmly in randomization and the formulation of ideas and methods in terms of potential outcomes. Instead of prescribing a model for each design, we begin with the treatment assignment mechanism and link it directly to the observed outcomes through the potential outcomes framework. This formulation illuminates how changing the design changes the analysis, and it naturally distinguishes finite-population inference from super-population modeling. The book also incorporates new developments at the interface of causal inference and experimental design, many stemming from the authors' recent collaborative research efforts. - Strengthens the link between design and analysis, enabling students to see immediately how the structure of an experiment shapes the exact tools used to analyze it. - Teaches foundational concepts without assuming linear-model assumptions. - Equips readers with the tools needed to analyze non-standard and complex experiments, whose randomization mechanisms fall outside the scope of traditional textbooks. - Support students with limited programming experience by providing algorithms and code throughout the book, enabling them to implement randomization-based methods easily and efficiently. This book is a textbook for one/two semester course on introductory experimental design.

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