

**Tuesday May 23**

8a – 5p

**Short Course: Precision Medicine Through Optimal Treatment Regimes**

Marie Davidian, Butch Tsiatis, Shannon Holloway, North Carolina State University

The vision for precision medicine is a healthcare system that adapts to the uniquely evolving health status of each individual patient, so that treatment decisions made at milestones in the disease or disorder process are tailored to the characteristics of the patient. Treatment regimes operationalize precision medicine as a sequence of decision rules, each rule corresponding to a key decision, that map up-to-date patient information to a recommended treatment. An optimal treatment regime maximizes the mean of some cumulative clinical outcome if used to select treatments in a population of interest. In this course, we provide a rigorous but accessible introduction to estimation of optimal treatment regimes using data from observational or randomized studies. Topics covered include: formalizing an optimal treatment regime using potential outcomes; estimators for an optimal treatment regime, including methods based on regression modeling and inverse probability weighting, including Q-learning, policy search, and outcome weighted learning; design and analysis of sequential multiple assignment randomized trials (SMARTs), the gold standard data source for estimation of optimal treatment regimes; and R software for constructing and evaluating estimated optimal treatment regimes. No prior exposure to treatment regimes is assumed. Participants should have a good working knowledge of standard statistical methods, including regression analysis.

8a – noon

**Workshop: New Matching Methods for Causal Inference**

Jose Zubizarreta, University of Pennsylvania

In observational studies of causal effects, matching methods are often used to approximate the ideal study that would be conducted if it were possible to do it by controlled experimentation. In this workshop, Jose Zubizarreta will discuss new advancements in matching methods that allow the investigator to overcome three limitations of standard matching approaches by: (i) directly obtaining flexible forms of covariate balance; (ii) producing self-weighting matched samples that are representative by design; and (iii) handling multiple treatment doses without resorting to a generalization of the propensity score and instead balancing the original covariates. He will also discuss extensions to matching with instrumental variables and in discontinuity designs, and for matching before randomization in experiments. These methods will be illustrated with the statistical software package 'designmatch' for R.

**NISS Workshop: Causal Inference and Machine Learning/High Dimensional Data**

**Machine Learning, Computation, and Causal Inference**

Organizer: Cynthia Rudin, Duke University

*Causal Inference with High-Dimensional Controls and Parameters of Interest*

Alex Belloni, Duke University

*Causal Analysis for Big Data using Techniques from Databases*

Sudeepa Roy, Duke University

*Estimating Optimal Intervention Strategies Against an Intelligent and Adaptive Adversary with Application to Real-Time Disruption of Human Trafficking in the United States*

Eric Laber, North Carolina State University

*Hypothesis tests that are robust to subjective choices in matching*

Cynthia Rudin, Duke University

**High-Dimensional Causal Inference**

Organizer: Avi Feller, UC Berkeley

*Approximate Residual Balancing: De-Biased Inference of Average Treatment Effects in High Dimensions*

Stefan Wager, Stanford University

*Overlap and Deconfounding Scores in High Dimensions*

Alex D'Amour, UC Berkeley

*Selecting Subpopulations for Causal Inference in High Dimensional Settings*

Alessandra Mattei, University of Florence

Discussant: Jas Sekhon, UC Berkeley

**Estimating Causal Networks in High-Dimension Observational Data**

Organizer: Donglin Zeng, University of North Carolina

*Inference in Gaussian DAGs with Known Partial Ordering*

George Michailidis, University of Florida

*Estimating Latent Causal Network through Sparse Mixed Effects Directed Acyclic Graphs*

Yuanjia Wang, Columbia University

*Estimating the Skeleton of High Dimensional Directed Acyclic Graphs*

Jichun Xie, Duke University

*Estimation of Sparse Directed Acyclic Graphs through a Lasso Framework and its Applications*

Hua Zhong, New York University

**Junior Researcher Mixer**

## Wednesday May 24

8a – 830a Breakfast

830a – 930a **Keynote:** Susan Athey, Stanford  
Discussant: Eric Tchetgen Tchetgen, Harvard

930a – 1045a **Machine Learning and Causal Inference**  
Organizers: Jennifer Hill and Uri Shalit, New York University

*Automated versus Do-It-Yourself Methods for Causal Inference: Lessons Learned from a Data Analysis Competition*

Uri Shalit, New York University

*Combining Observational and Experimental Data to Find Heterogeneous Treatment Effects*  
Alex Peysakhovich, Facebook

*Bayesian Causal Forests*  
Richard Hahn, University of Chicago

*Counterfactual Prediction using Deep Instrumental Variables Networks*  
Greg Lewis, Microsoft

1045a Break

11a – 1215p **Causal Inference for Randomized Trials**  
Organizer: Ashley Naimi, University of Pittsburg  
Moderator: Enrique Schisterman, NICHD

*Estimating The Effect of Continued Breastfeeding on Infant Hospitalizations in a Cluster Randomized Encouragement Trial*  
Mireille Schnitzer, University of Montreal

*Generalizing the Adjusted Per-protocol Treatment Effect using Inverse Probability Weights*  
Haidong Lu, University of North Carolina

*G Computation for Compliance Adjustment in Randomized Trials: An Example using the Effects of Aspirin on Gestation and Reproduction Trial*  
Ashley Naimi, University of Pittsburgh

Discussant: Robert Platt, McGill University

11a – 1215p **Survey Sampling and Causal Inference**  
Organizer: Peng Ding, UC Berkeley

*General Forms of Finite Population Central Limit Theorems with Applications to Causal Inference*  
Peng Ding, UC Berkeley

*Using Standard Tools from Finite Population Sampling to Improve Causal Inference for Complex Experiments*  
Tirthankar Dasgupta, Harvard University

*Efficient Estimation of Sample Average Treatment Effects*

Yotam Shem-Tov, UC Berkeley

*The Horvitz-Thompson Theorem as Unifying Perspective for Survey Sampling and Causal Inference*

Peter Aronow, Yale University

1215p Lunch

130p – 245p **New Methods for Digital Experimentation**

Organizer: Jas Sekhon, UC Berkeley

*Adaptive Field Experiments using Bayesian Optimization*

Eytan Bakshy, Facebook

*Trustworthy Analysis of Online A/B Tests: Pitfalls, Challenges and Solutions*

Alex Deng, Microsoft

*Empirical Bayes Estimators for Online Experiments*

Drew Dimmery, Facebook

Discussant: Erin Hartman, UCLA

250p – 405p **Generalizing Treatment Effects from One or a Collection of Randomized Trials to a Target Population in the Presence of Treatment Effect Heterogeneity: Identification, Estimation and Sensitivity Analysis**

Organizer: Elizabeth Stuart, Johns Hopkins

*Generalizing Study Results: A Potential Outcomes Perspective*

Catherine Lesko, Johns Hopkins

*Sensitivity Analyses for Partially or Fully Unobserved Effect Modifiers when Calibrating the Effect from a Randomized Trial to a Target Population*

Trang Quynh Nguyen, Johns Hopkins

*Transporting the Results of Multiple Randomized Controlled Trials to a Target Population:*

*Towards Causally Interpretable Meta-Analysis*

Issa J. Dahabreh, Brown University

Discussant: Robert Platt, McGill University

250p – 405p **Innovations in discovering effect modification**  
Organizer: Ashkan Ertefaie, University of Rochester

*Causal Interaction in Factorial Experiments: Application to Conjoint Analysis*

Kosuke Imai, Princeton University

*Optimal Policy Learning*

Stefan Wager, Stanford University

*Post-Selection Inference for the Effect Modifiers Selection*  
Qingyuan Zhao, University of Pennsylvania

Discussant: Susan Athey, Stanford University

405p Break

420p – 535p **Modern Advances in Instrumental Variable Methods**  
Organizers: Luke Keele, Georgetown University; Edward Kenedy, Carnegie Mellon University

*Survivor-Complier Causal Effects in a Study of Prompt ICU Admission with Selection on Treatment*  
Luke Keele, Georgetown University

*Bounds on Complier average causal effects with continuous treatments*  
Edward Kennedy, Carnegie Mellon University

*TMLE for Marginal Structural Models Based on an Instrument*  
Boriska Toth, UC Berkeley

*Testing Endogeneity with Possibly Invalid Instruments and High Dimensional Covariates*  
Hyunseung Kang, University of Wisconsin, Madison

Discussant: Elizabeth Ogburn, Hopkins

420p – 535p **Lightning Talks and Ten Have Winner**

*Constructed Second Control Groups and Attenuation of Unmeasured Biases*  
Sam Pimentel, University of Pennsylvania  
\* 2016 Tom Ten Have Winner \*

6p – 8p Tom Ten Have Poster Session

8p --10p Reception featuring The Imposteriors

## Thursday May 25

8a Breakfast

830a – 930a **Keynote:**  
*Model and Variable Selection in Causal Inference*  
James Robins, Harvard

Discussant: Michael R. Kosorok, University of North Carolina

930a – 1045a **Causal Inference in Air Pollution Epidemiology**  
Organizer: Richard Smith, University of North Carolina

*The Effects of Policy-Driven Air Quality Improvements on Children's Respiratory Health*

Kiros Berhane, University of Southern California

*Efforts to quantify the causal effect of fine particulate matter on mortality*  
Zhengyuan Zhu, Department of Statistics, Iowa State University

*Progress in Automated Inference and Estimation of Causal Concentration-Response Functions in Air Pollution Epidemiology*  
Tony Cox, University of Colorado

1045a Break

11a – 1215p **Different Modes of Inference under Interference**  
Organizer: Laura Forastiere, University of Florence

*Randomization Inference in Networks*  
Dean Eckles, MIT

*A Folk Theorem on Interference in Experiments*  
Fredrik Savje, UC Berkeley

*Estimation and Testing in Two-Stage Randomized Designs with Interference*  
Avi Feller, UC Berkeley

*Exploring encouragement, spillover and attendance effects in a field experiment on museums attendance of high school teens using principal stratification*  
Fabrizia Mealli, University of Florence

11a – 1215p **Balance at Baseline in Experiments and Observational Studies: New Measures, New Implications**  
Organizer: Ben Hansen, University of Michigan

*The Classification Permutation Test: A Nonparametric Test for Equality of Multivariate Distributions*  
Johann Gagnon-Bartsch, University of Michigan  
\* 2016 Tom Ten Have Winner \*

*New multivariate tests for assessing covariate balance in matched observational studies*  
Hao Chen, University of California, Davis

*Balancing Basu's elephants: Limiting bias of subgroup effect estimates, particularly in stratified cluster randomized trials*  
Mark Fredrickson, University of Illinois, Urbana-Champaign

*Appraising Covariate Balance as Part of Experimental Design*  
Kari Lock Morgan, Pennsylvania State University

1215p Lunch

130a – 245p **Causal Inference with Unobserved Confounders**  
Organizer: Eric Tchetgen Tchetgen, Harvard and Wang Miao, Beijing University

*Unification of the Instrumental Variable Approach for Causal Inference and Missing Data*

Eric Tchetgen Tchetgen, Harvard

*Bounded, Efficient and Triply Robust Estimation of Average Treatment Effects using Instrumental Variables*

Linbo Wang, Harvard

*Optimal Criteria to Exclude the Surrogate Paradox and Sensitivity Analysis*

Lan Liu, University of Minnesota

*Testing Causative Hypotheses in the Presence of Unmeasured Confounding*

Wang Miao, Beijing University

Discussant: James Robins, Harvard

245p – 4p

**Interference and Social Networks**

Organizer: Lan Liu, University of Minnesota – Twin Cities

*Modeling Interference Via Symmetric Treatment Decomposition*

Ilya Shpitser, Johns Hopkins

*Estimation of Monotone Treatment Effects under Interference*

David Choi, Carnegie Mellon University

*Estimating Treatment and Spillover Effects in Observational Social Network Data*

Laura Forastiere, University of Florence

Discussant: TBD