

University of Chicago and Toyota Technological Institute at Chicago  
Machine Learning Seminar Series

**PRESENTS:**



**Rosemary Braun**  
Northwestern University

**Title:** Using Gene Expression to Tell Time

**Abstract:** Determining the state of an individual's internal physiological clock has important implications for precision medicine, from diagnosing neurological disorders to optimizing drug delivery. To be useful, such a test must be accurate, minimally burdensome to the patient, and robust to differences in patient protocols, sample collection, and assay technologies. In this talk I will present TimeSignature, a novel machine-learning algorithm to estimate circadian variables from gene expression in human blood. By making use of the high dimensionality of the gene expression measurements and exploiting the periodic nature of the circadian variables we wish to predict, TimeSignature can be applied to samples from disparate studies and yield highly accurate results despite systematic differences between the studies. This generalizability is unique amongst expression-based predictors and addresses a major challenge in the development of robust biomarker tests. This talk will detail the method, present several applications, and discuss our recent work to extend it.

**Bio:** Rosemary Braun (PhD, MPH) is an Assistant Professor in the Division of Biostatistics (Dept of Preventive Medicine, Feinberg School of Medicine) and the Department of Engineering Sciences and Applied Mathematics at Northwestern University. Dr Braun's overarching research interests are in the development of mathematical and computational methods to elucidate how large-scale biological phenomena emerge from the complex interplay of thousands of microscopic interactions. To this end, her research group develops machine-learning methods for the statistical analysis of high-dimensional omics data; graph-theoretical approaches for modeling the behavior of regulatory networks; and dynamical simulations to study molecular interactions. Recent publications have appeared in PNAS, Nucleic Acids Research, and Bioinformatics. Dr Braun obtained her PhD in Physics in 2004 from the University of Illinois at Urbana Champaign, where she studied the statistical physics of living systems under Klaus Schulten. This was followed by an MPH (Concentration in Biostatistics) at Johns Hopkins in 2006. Prior to joining Northwestern, she was a Postdoctoral Fellow at the National Cancer Institute (2006-2011).

**Host:** Rebecca Willett

Wednesday, May 8, 1:00 – 2:00 pm  
Harper Center (Booth) Room 219  
Pizza provided by UChicago CS Department