

**Title:**

Healthcare Modeling and Decision Making: Models and Insights for Chronic Diseases

Presenter: Shan Liu

**Abstract:**

How can patients and health care providers make the best treatment decisions under uncertainties and resource constraints? I investigate this question by evaluating new medical technologies and health interventions in the context of chronic disease management. I discuss some of my recent work in the field of healthcare modeling and medical decision making for chronic hepatitis C (HCV). Chronic HCV is a difficult to treat disease affecting approximately 3 million Americans. Newer treatments show great promise in providing better health outcomes at significant costs. I will present an overview of several cost-effectiveness studies of new diagnostic test, genetic marker guided therapy, treatment deliveries in integrated health care systems, and population screening policies to improve the long-term health outcomes of 2 million Americans with HCV. I will also present a theoretical study on the impact of uncertainty about future technological progress on patients' treatment adoption decisions. In particular, how long should a patient with a treatable chronic disease wait for more effective treatment before accepting the best available treatment? We explore this patient-level treatment adoption decision as an optimal stopping problem using a discrete-time, finite-horizon Markov Decision Process. Results of these work provide insights by informing both individuals and organizations in making technology adoption decisions during rapid technological advancement under resource constraints.

**Short Bio:**

Professor Liu joined IS&E in September 2013 after completing her Ph.D. in Management Science & Engineering from Stanford University. Previously, she received a M.S. in Technology and Policy from MIT, and a B.S. in Electrical Engineering from The University of Texas at Austin. Her research areas are medical decision making in the era of personalized medicine and healthcare policy modeling. She integrates techniques such as optimization, decision analysis, and systems modeling to solve population healthcare problems. She is interested in developing decision theory and applied mathematical models for optimal disease management when there is rapid technological development.

Prof. Liu had work experience and collaborations with the Stanford Center for Primary Care and Outcomes Research, the Veteran Affairs Palo Alto Health Care System, the United Nations Industrial Development Organization, the MIT Microphotonics Center, HP Labs China, and the Cable Television Laboratories Inc. She is a member of INFORMS (Institute of Operations Research and the Management Science), the Society for Medical Decision Making (SMDM), and the Tau Beta Pi Engineering Honor Society.