Prostate cancer is the most common solid tumor that affects American men. Screening typically involves the use of prostate specific antigen (PSA) tests. However, the imperfect nature of PSA tests and the fact that many cancers are likely indolent, means there is the potential for screening to cause harm due to unnecessary biopsies and treatment. Newly discovered biomarkers offer the opportunity to improve screening protocols, but there high cost and imperfect predictive value have raised many questions about whether and when to use them. In this talk I will provide some background on the clinical process for prostate cancer screening and treatment. Next, I will discuss some models for the optimal design of screening strategies, including a partially observable Markov decision process (POMDP) model. Some theoretical properties of the optimal policy will be discussed, and an approximation method suited to solving finite horizon non-stationary POMDPs will be presented. The results of computational experiments will be used to illustrate the use of the model for making screening protocol design decisions, such as if and when to recommend a patient for biomarker testing, and when to refer patients for biopsy and subsequent treatment. The talk will conclude with a discussion of future research directions.

Bio

Brian Denton is an Associate Professor in the Department of Industrial and Operations Engineering at University of Michigan, in Ann Arbor, MI. Previously he has been an Associate Professor in the Department of Industrial & Systems Engineering at NC State University, a Senior Associate Consultant at Mayo Clinic, and a Senior Engineer at IBM. He is past president of the INFORMS Health Applications Section and he serves as Secretary on the INFORMS Board of Directors. His primary research interests are in optimization under uncertainty with applications to health care delivery and medical decision making. He completed his Ph.D. in Management Science at McMaster University, his M.Sc. in Physics at York University, and his B.Sc. in Chemistry and Physics at McMaster University in Hamilton, Ontario, Canada.