



Timothy Chan
**“Inverse Optimization and Applications to
Knowledge-based Radiation Therapy Treatment”**

Monday October 6, 2014, 4:30-6:30PM in 1123 LBME

This talk has two parts. The first part will introduce the concept of inverse optimization and present some recent advances in the theory of inverse optimization. The second part will introduce radiation therapy treatment planning for cancer and illustrate how inverse optimization can be used to improve the planning process.

We generalize the standard method of solving inverse optimization problems to allow for the solution of inverse problems that would otherwise be ill posed or infeasible. In multiobjective linear optimization, given a solution that is not a weakly efficient solution to the forward problem, our method generates objective function weights that make the given solution a near-weakly efficient solution. Our generalized inverse optimization model specializes to the standard model when the given solution is weakly efficient and retains the complexity of the underlying forward problem.

Intensity-modulated radiation therapy (IMRT) treatment planning typically combines multiple criteria into a single objective function by taking a weighted sum. The authors propose a statistical model that predicts objective function weights from patient anatomy for prostate IMRT treatment planning. This study provides a proof of concept for geometry-driven weight determination.

Timothy Chan is an Associate Professor in the Department of Mechanical and Industrial Engineering at the University of Toronto and Director of the Centre for Research in Healthcare Engineering. He received his BSc in Applied Mathematics from the University of British Columbia (2002), and his PhD in Operations Research from the Massachusetts Institute of Technology (2007). Professor Chan was an Associate in the Chicago office of McKinsey and Company, a global management consulting firm (2007-2009). During that time, he advised leading companies in the fields of medical device technology, travel and hospitality, telecommunications, and energy on issues of strategy, organization, technology and operations.

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