DEPARTMENT of INDUSTRIAL ENGINEERING
UNIVERSITY of HOUSTON

FRIDAY SEMINAR SERIES
BROADEN HORIZONS | EXTEND MINDS

Professor Archis Ghate
Department of ISE
The University of Washington in Seattle

Date: Friday, October 19, 2018

Time: 1 - 1:50 pm

Location: D3 W122

Optimal fractionation in radiotherapy

Abstract: In radiotherapy for cancer, the total planned dose is usually broken into several treatment sessions called fractions that are administered over several weeks. A key challenge here is to choose an optimal number of fractions and the corresponding dosing schedule. This is called the optimal fractionation problem. In this talk, we discuss how to address this problem via the linear-quadratic model of dose-response. We introduce both stylized and full-scale optimization models for this problem. Assuming that a fluence-map optimization problem has been solved *a priori*, we derive a closed-form solution to the fractionation problem. Our full-scale model attempts to simultaneously optimize the fluence-map and the number of fractions, resulting in a *non-convex* problem with many variables and constraints. We present an efficient *convex* optimization algorithm to approximate the solution of this non-convex problem. Numerical experiments and sensitivity analyses on head-and-neck and prostate cancer test cases will be discussed. Robust and stochastic variations of the fractionation problem may also be discussed if time permits.

Biography: Archis is a Professor and Associate Chair in the ISE Department at the University of Washington in Seattle, where he currently holds the College of Engineering Endowed Professorship in Healthcare Operations Research. He joined the University of Washington as an Assistant Professor in 2006 after receiving a PhD in Industrial and Operations Engineering from the University of Michigan in 2006, and an MS in Management Science and Engineering from Stanford in 2003. He completed his undergraduate education at the Indian Institute of Technology, Bombay, India, in 2001. His field of study is Operations Research with a methodological focus on stochastic and convex optimization. Archis is a recipient of the NSF CAREER award, and of the award for Excellence in Teaching Operations Research from the Institute of Industrial Engineers. Archis has served on the editorial boards of several journals.