

A journey through optimal fractionation in cancer radiotherapy

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Abstract: In this talk, I will tell a story about how my research group stumbled through mathematically formalizing and solving a century-old problem in cancer radiotherapy. The problem involves finding an “optimal” number of treatment sessions, often called fractions. I will describe how I came across this problem by chance while having coffee at the HUB, what was known before we started working on it, how we built its most comprehensive formulation known to date, and how we discovered its most complete solution. Unlike a typical research seminar, this talk will include derivations and proofs specifically geared toward new graduate students in ISE, and will use tools from calculus, real analysis, convex optimization, robust optimization, and dynamic programming. I will cover positive as well as negative results, and outline open questions. The hope is to share my passion for mathematically rigorous work in applied Operations Research with incoming students.

Bio: *Archis Ghate* is an Associate Professor of Industrial and Systems Engineering at the University of Washington in Seattle. His research focuses on stochastic optimization and mathematical programming. He received a PhD from the University of Michigan, an MS from Stanford University, and completed his undergraduate education at the Indian Institute of Technology. He is a recipient of the NSF CAREER award and the award for Excellence in Teaching Operations Research from the Institute of Industrial Engineers. His doctoral students have won the Dantzig dissertation award and the Bonder scholarship from INFORMS, as well as other competitive awards from the University of Washington. Archis loves playing tennis and watching Netflix.