



DECISION-MAKING UNDER UNCERTAINTY

PROF. N. GAUTAM

Department of Electrical Engineering and Computer Science
Syracuse University

INTENDED AUDIENCE: Any Interested Learners

PRE-REQUISITES : Undergraduate course in Probability (including topics on random variables and expected value); Calculus and Algebra

INDUSTRIES APPLICABLE TO : Most industries would find this useful (examples in course are in retail, supply chain and hospitality)

COURSE OUTLINE :

We are often faced with situations where we need to make decisions that have implications for personal and institutional goals. When there is uncertainty involved, we could either go with our gut feeling or take an analytical approach by characterizing the uncertainty, defining an objective, and evaluating the risk/payoffs of choices. This course is about the latter and is presented through the usage of example problem instances.

ABOUT INSTRUCTOR :

Prof. N. Gautam is a Professor at Syracuse University in the department of electrical engineering and computer science. He received his B. Tech. in Mechanical Engineering at IIT Madras followed by an M.S. and Ph.D. in Operations Research from the University of North Carolina at Chapel Hill. Since 1997 he has taught courses in applied probability, stochastic systems, queuing models, decision-making, operations research, and statistics while being on the faculty at Pennsylvania State University and Texas A&M University. Gautam spent a semester at Singapore University of Technology and Design where he developed and taught a stochastic modeling course. He has given seminars in institutions around the world and is involved in research on topics related to this course. He is a Fellow of the Institute of Industrial and Systems Engineering

COURSE PLAN :

Week 1: Background and Introduction: Risk, Uncertainty and Variability; Probability, Random Variables and Expectation; Optimization Criteria; Types of decisions

Week 2: One-time decisions: Secretary problem; Utility function; Decision trees; TV game shows; Monte Hall problem; Project evaluation

Week 3: Repeated decisions: News vendor problem; Buffering to manage uncertainty; Safety stock for inventory; Route planning; Exploration vs. exploitation

Week 4: Sequential adaptive decision-making: Strategic and Operational; Stochastic Programming; Simpson's Paradox; Markov decision process