



Probability for Computer Science

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INTENDED AUDIENCE : Computer Science & Engineering, Mathematics, Electronics, Physics, Statistics, & similar disciplines.

INDUSTRIES APPLICABLE TO : Machine Learning, Data Streaming, Discrete Optimization, Cryptography, Coding theory, Computer Algebra, Cyber

COURSE OUTLINE :

Probability is one of the most important ideas in human knowledge. This is a crash course to introduce the concept of probability formally; and exhibit its applications in computer science, combinatorics, and algorithms. The course will be different from a typical mathematics course in the coverage and focus of examples. After finishing this course a student will have a good understanding of both theory and practice of probability in diverse areas.

ABOUT INSTRUCTOR :

He completed my Bachelors in Computer Science from the Indian Institute of Technology, Kanpur in 2002 and completed my PhD under Manindra Agrawal in 2006. He is broadly interested in Computational Complexity Theory, Algebra, Geometry and Number Theory. He have been a visiting graduate student in Princeton University (2003-2004) and National University of Singapore (2004-2005); a postdoc at CWI, Amsterdam (2006-2008) and a Bonn Junior Fellow (W2 Professor) at Hausdorff Center for Mathematics, Bonn (2008-2013). Since April 2013, He have a faculty position in the department of CSE, IIT Kanpur.

COURSE PLAN :

Week 1: Introductory examples. Probability for finite space.

Week 2: Sigma algebra. Conditional probability

Week 3: Expectation. Famous random variables.

Week 4: Concentration inequalities. Boosting by Chernoff.

Week 5: Stochastic process.

Week 6: Stationary distribution examples.

Week 7: Probabilistic method examples.

Week 8: Streaming algorithms.