



### An Introduction to Probability in Computing

Computer Science and Engineering

**Instructor Name:** Prof. John Augustine

**Institute:** IIT Madras

**Department:** Computer Science and Engineering

**About Instructor:** John Augustine earned his PhD in theoretical computer science in 2006 from the Donald Bren School of Information and Computer Science, University of California, Irvine, USA. Since then, his career has spanned both academia and industry. In 2011, he joined the Department of Computer Science and Engineering at IIT Madras, where he is currently an associate professor. His research interests are in designing and analyzing algorithms for foundational problems. In the last few years, he has been interested in designing randomized algorithms for distributed computing environments and employing probabilistic techniques to analyze them.

**Pre Requisites:** : A course on design and analysis of algorithms is a required prerequisite.

**Core/Elective:** : Elective

**UG/PG:** : Both

**Industry Support** : All companies that use machine learning, data science, data mining, and other randomized algorithm design.

**Course Intro:** : With the advent of machine learning, data mining, and many other modern applications of computer science, we are increasingly seeing the influence of probability theory on computer science. This course is aimed at providing a brief introduction to probability theory to CS students so that they can grasp recent CS trends more easily.

#### COURSE PLAN

SL.NO	Week	Module Name
1	1	A brief axiomatic introduction to discrete probability theory – Karger’s Mincut
2	2	Random Variables – Quicksort
3	3	Markov’s and Chebyshev’s Inequalities – Randomized Median
4	4	Chernoff Bounds – Parameter Estimation & Quicksort Revisited