PROBABILITY - I WITH EXAMPLES USING R

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PRE-REQUISITES : Basic Calculus

INTENDED AUDIENCE : Anyone who has completed one year of undergraduate degree in Engineering or Sciences

COURSE OUTLINE :
The course will cover basic concepts in Probability. It will begin with fundamental notions of Sample Space, Events, Probability, conditional probabilities And independence. We shall formalise notation in terms of Random Variables and discuss standard distributions such as (discrete) Uniform, Binomial, Poisson, Geometric, Hypergeometric, Negative Binomial and (continuous) Normal, Exponential, Gamma, Beta, Chi-square, and Cauchy. We will conclude with the law of large numbers and central limit theorem. A unique feature of this course will be that we will use the package R to illustrate examples.

ABOUT INSTRUCTOR :
Prof. Siva Athreya, is a Professor at the Indian Statistical Institute, Bangalore. He works in the area of Probability theory. He teaches in the B.Math (hons.), M.Math and Ph.d programs.

COURSE PLAN :

Week 1:
  * Sample Space, Events and Probability
  * Properties of Probability
  * R set up
Week 2:
  * Equally likely Outcomes
  * Conditional Probability
  * Bayes Theorem
Week 3:
  * Independence
  * Sampling and Repeated Trials
Week 4:
  * Sampling and Repeated Trials(Cont.,)
  * Sampling and Repeated Trials(Cont.,)
  * Gambler's Ruin
Week 5:
  * Sampling with and without replacement
  * Sampling without replacement
  * Hypergeometric Distribution and Discrete Random Variables
Week 6:
  * Discrete Random Variables
Week 7:
  * Conditional, Joint and Marginal Distributions
  * Memoryless property of Geometric Distribution
Week 8:
  * Expectation of Random Variables
  * Properties of Expectation
  * Variance of Discrete Random Variables
Week 9:
  * Expectation :Independence and Functions
  * Markov and chebyschev Inequalities
  * Conditonal Expectation and Covariance
Week 10:
  * Functions of Random Variables
  * Sums of Independent Random Variables
  * Functions and Independence
Week 11:
  * Continuous Random Variables
  * Exponential and Normal Random Variable
  * Convergence of binomial to Normal
Week 12:
  * Normal Random Variable
  * Distribution Function