



# STATISTICAL INFERENCE

**PROF. NILADRI  
CHATTERJEE**

Department of Mathematics  
IIT Delhi

**TYPE OF COURSE** : Rerun | Core | UG/PG

**COURSE DURATION** : 8 weeks (18 Jan' 21 - 12 Mar' 21)

**EXAM DATE** : 21 Mar 2021

**PRE-REQUISITES** : Background of Probability, Basic Knowledge of Data its collection and descriptive statistics

**INTENDED AUDIENCE** : Students and practitioners of Statistics, Mathematics

**INDUSTRIES APPLICABLE TO** : Parameter Estimation and Testing of Hypothesis are basic requirements

## **COURSE OUTLINE :**

This course aims at giving the foundation knowledge of Probability and Statistical Inference. In particular, it gives details of theory of Estimation and testing of hypothesis. Both theoretical aspect will be discussed and practical problems will be dealt with in great detail. This course will help students and practitioners of statistics at both UG and PG level. This course will also serve as a foundation course for students working on Machine Learning.

## **ABOUT INSTRUCTOR :**

Prof. Niladri Chatterjee is a professor of Department of Mathematics, IIT Delhi. He is B.Stat and M.Stat from Indian Statistical Institute Kolkata. He is an M.Tech in Computer Science and PhD in Computer science from University College London. His major research interests are Statistical Modeling, Big Data, Artificial Intelligence, Machine Learning, Natural Language Processing among others. He has more than 30 years of research and teaching experience. He is also member of several Government committees related to data science. He is currently Chair Professor in AI and Machine Learning.

## **COURSE PLAN :**

**Week 1:** Revision of Probability, Different Discrete and Continuous Distributions

**Week 2:** Functions of Random Variables and their distributions, T, Chi-sq, F distributions and their Moments

**Week 3:** Introduction of Statistics and the distinction between Data and its properties, and probabilistic models

**Week 4:** Estimator and methods of estimation, Properties of an estimator: Consistency, Unbiasedness, Efficiency and Sufficiency

**Week 5:** Neyman Factorization, Cramer-Rao Bound

**Week 6:** Confidence Intervals, Concepts of hypothesis testing, Characteristics of Good Hypothesis, null and Alternative Hypotheses, Types of Errors

**Week 7:** Inference on Population mean, Comparing two population means, Inference on Variance, Comparing two population variance

**Week 8:** Neyman Pearson Lemma