# Statistical Inference 3 - An Outline

In this topic we shall be concerned about the large sample behavior of statistics.

We shall start with different convergence criteria of sequence of random variables – convergence in probability, convergence in law, almost sure convergence. We shall consider different versions of Weak Law of Large Numbers and Central Limit Theorems (CLTs).

Using CLTs we shall see how we can conduct tests and obtain confidence intervals for Binomial proportion, Poisson mean, etc.

We shall further find out the asymptotic distributions of some statistics like sample coefficients of skewness, kurtosis, etc. We shall also derive the asymptotic distributions of sample quantiles.

We shall learn what is meant by variance stabilizing transformations and their applications. In this context we shall study Fisher's Z transformation.

We shall also consider consistency and asymptotic efficiency of the estimators and the results concerning these properties. Asymptotic properties of Maximum Likelihood estimators will also be considered.

We shall finally consider Pearsonian chi-square statistic and its use for testing goodness of fit, independence and homogeneity.

**Pre-requisites for this Course**

- Knowledge of convergence of series and sequence of functions.
- Knowledge of random variables and their univariate and bivariate probability distributions.
- Basic theoretical distributions.
- Probability inequalities.
- Basic statistical inference.

**Outcome of the Course**

- Knowledge of large sample behavior of statistics – based on both moments and quantiles.
- Conducting tests and obtaining confidence intervals regarding various parametric functions when the sample size may be considered to be large.
- Knowledge of large sample behavior of estimators.
- Knowledge of Pearsonian chi-square statistic and its applications.

**References:**

1.  A.M.Gun, M.K. Gupta & B.Dasgupta : An Outline of Statistical Theory (Vol. 1 & 2).
2.  P. Mukhopadhyay : Mathematical Statistics.
3.  V.K. Rohatgi & A.K.M.E. Saleh: An Introduction to Probability and Statistics.
4.  C.R. Rao: Linear Statistical Inference and its Application.
5.  R.V. Hogg and A.T. Craig: Introduction to Mathematical statistics.