Course Type	Course Cod	Name of Course	L	T.	Ρ	Credit
ESC	NMCE101	Statistical Methods	3	0	0	3

## Course Objective To offer a foundation in probability theory and statistical inference in order to solve applied problems and to prepare for more advanced courses in probability and statistics Learning Outcomes

This course will provide a solid undergraduate foundation in both probability theory and mathematical statistics and at the same time provides an indication of the relevance and importance of the theory in solving problems in the real world.

Unit	Topics to be Covered	Lecture	Learning Outcome
No.		Hours	
1.	Definition of statistics, types of data, concept of frequency distributions. Measures of central tendency, dispersion, skewness and kurtosis.	4	To understand the nature and deviation of data.
2.	Concepts of probability-various approaches and properties. Random variables, probability functions- pmf, pdf, cdf. Expectation and its properties. Moment generating & characteristics functions.	8	To understand the logic of probability. To find the descriptive statistics of distributions through moment generating function.
3.	Statements of Markov and Chebyshev inequalities and its application. Statement of Law of large numbers; WLLN, SLLN, Central limit theorem.	4	To obtain the different probability bounds of data and to understand behaviour of random varibales in asymptotic set-up.

4.	Some discrete probability distributions: Uniform, Bernoulli, Binomial, Negative Binomial, Geometric, Hyper Geometric, Poisson distributions. Some Continuous probability distributions: Uniform, Normal, Exponential, Gamma, Beta, Weibull probability distributions. Definitions of sampling distributions- z, t, chi square & F. Order statistics and their probability distribution.	8	To understand the concept of a random variable and analyse the ideal patterns of data.
5.	Concept of correlation coefficients- product moment correlation coefficient, Spearman rank correlation coefficient, multiple and partial correlation coefficients. Concept & derivations of linear regression model (maximum 3 variables), properties of regression coefficients. Bivariate normal distribution.	6	To know the relationship between variables and predict (estimate) the value of dependent variables.
6.	Population, sample, parameters. Point and interval Estimation-some methods. Testing of hypothesis- null and alternate hypothesis, Neyman Pearson fundamental lemma, Z, t, Chi-square and F tests. Analysis of variance: One-way and Two-ways with their applications.	12	To have idea about statistical inference

## **Text Book**:

- 1. Sheldon M. Ross, First Course in Probability, A, 9th Edition, Pearson, Boston, 2014.
- 2. V.K. Rohatgi and A.K. Md. Ehsanes Saleh, An Introduction to Probability and Statistics, John Wiley & Sons, 3rd Edition, 2015

## **Reference Books:**

- 1. Hogg, R.V., McKean, J.W. and Craig, A.T., Introduction to Mathematical Statistics. 7th Edition, Pearson, Boston, 2013.
- 2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics (A Modern Approach) 10th Edition, Sultan Chand & Sons, 2002.