OLMDS502	Probability and Distribution Models	L	T	P	C
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Pre-requisite	NIL	Syllabus version			
		1.0			

Course Objectives

1. To acquaint the students with some basic concepts and knowledge of Statistical methods of computations and analysis of data.
2. To develop the foundations of some of the elementary statistical methods of analysis of data.
3. To impart knowledge of distribution functions in real life situations.

Course Outcome

At the end of the course students will be able to:

1. Understand the basics of Probability theory.
2. Discuss the concepts of functions of random variables and distribution functions for data analytics.
3. Fit discrete and continuous distributions.
4. Analyse the data and interpret using sampling distributions.

Module:1	Probability: Sample space and events

Concepts and meanings of sample space, random experiments, events, discrete sample space-finite and countably infinite; Classical, axiomatic and empirical or limiting definition of probability. Some basic rules of probability. Addition and multiplication theorem of probability. Applications using R programing language.

Module:2	Conditional probability

Conditional probability and independence, Bayes' Theorem (with proof) and applications using R.

Module:3	Random variables : One & Two dimensional

Random variable, Discrete Random variables, Continuous random variables, Probability mass function, Probability density function; Cumulative distribution function. Joint Distributions, Joint Mass Function; Bivariate distributions, Marginal and Conditional Distributions; Independence of Random Variables.

Module:4	Mathematical Expectation

Introduction, concept, definition and meaning of expectation; The expected value of discrete and continuous random variables; Properties of mathematical expectation; Conditional expectation; Variance and covariance using simple and conditional expectations.

Module:5	Discrete Distributions

Definition-properties and simple problems of Bernoulli-Binomial-Poisson distributions and its applications. Geometric-Negative Binomial- Hypergeometric distributions. Fitting of these distributions using R.

Module:6	Continuous Distributions

Definition-properties-mean and standard deviation-empirical rule-determining intervals-standard normal distribution-finding z scores from areas-calculating values, probabilities and percentiles. Exponential-Gamma-Weibull distributions and Fitting these using R.

Module:7	Sampling Distributions

Chi Square distribution, Small samples, F distribution, logistic distribution, their interrelations and properties. Applications of Sampling distributions using R.

	Total Lecture hours:	120 hours

List of Tutorials

Introduction to computational procedure, import and export of data, data processing,

tabulation and visualization of data and charts, Diagrammatical Presentation of data
Various plots and graphical Presentation of Statistical Data
Computation of descriptive Statistics and summarizing the data
Computational methods of discrete distributions and generating random numbers using standard distributions.
Normal distribution : calculation of probabilities, fitting of normal data and related applications
Binomial distribution: Calculation of probabilities, fitting of binomial data and related applications on real time data.
Poisson distribution: Calculation of probabilities, fitting of Poisson data and related applications on real time data.
Exponential distribution: Calculation of probabilities, fitting of exponential data and related applications on real time data.
Gamma distribution: Calculation of probabilities, fitting of Gamma data and related applications on real time data.
Beta distribution: Calculation of probabilities, fitting of Beta data and related applications on real time data.
Text Book(s)
1. Bansilal, Sanjay Arora and Sudha Arora (2006): Introducing Probability and Statistics,2/e, Satya Prakashan Publications, New Delhi. 2. Douglas C. Montgomery, George C. Runger(2018), Applied Statistics and Probability for Engineers, Wiley. 3. Gupta,S.C. and Kapoor, V.K. (2000): Fundamentals of Mathematical Statistics, 10/e, Sultan Chand and sons.
Reference Books
1. Hogg, R.V. , Mc Kean J W and Craig, A.T.(2005): Introduction to Mathematical Statistics, 6/e Pearson Edition. 2. Bhat, B.R., Srivenkataramana, T and Rao Madhava, K.S. (1997): Statistics: A Beginner's Text, Vol. II New Age International (P) Ltd. 3. **Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani.** An Introduction to Statistical Learning: With Applications in R (Springer Texts in Statistics) 1st ed. 2013, Corr. 5th printing 2015 Edition. 4. Prabhanjan N. Tattar, Suresh Ramaiah, B. G. Manjunath, A Course in Statistics with R; Wiley, (2018).
Mode of Evaluation: Quiz, Assignment, Mid-Term and FAT.

Recommended by Board of Studies	28.10.2021		
Approved by Academic Council	No.65	Date	17-03-2022