

B.Sc(P)/B.A(P) with Statistics as Non-Major

Category-III

DISCIPLINE SPECIFIC CORE COURSE – 2: Statistical

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Statistical Methods	4	3	0	1	Class XII pass with Mathematics	Descriptive Statistics

Course Objectives:

The learning objectives include:

- To know the difference between discrete and continuous random variables.
- To develop the thinking of students so that they can use the concepts of statistical probability distribution in real life.
- To understand the concept of random variables, probability distributions and expectation

Course Learning Outcomes:

After completing this course, students should have developed a clear understanding of:

- Concept of random variables.
- Basic concepts of discrete & continuous random variables.
- Distinguish between Moments generating functions & Cumulant generating functions
- Concept of joint, marginal and conditional probability distribution for two dimensional random variables and their independence.
- Discrete probability distributions with their properties.
- Continuous probability distributions with their properties.

SYLLABUS OF DSC

Theory

Unit – 1 (15 hours)

Random Variables

Random variables: Discrete and continuous random variables, pmf, pdf and cdf, illustrations of random variables and its properties, expectation of random variable and its properties. Variance, covariance and their properties with illustrations. Moments and cumulants, moment generating function with properties, cumulants generating function and characteristic function.

Unit – 2 (8 hours)

Bivariate Probability Distribution

Bivariate probability distributions, marginal and conditional distributions, independence of variates (only general idea to be given). Transformation in univariate and bivariate distributions.

Unit – 3 (10 hours)

Discrete Probability Distributions

Discrete probability distributions – Binomial, Poisson- measures of central tendency, dispersion, skewness and kurtosis, recurrence relations based on moments, moment generating function, cumulant generating function, characteristic function, additive property, fitting of distribution and examples.

Unit – 4 (12 hours)

Continuous Probability Distributions

Continuous Probability distribution - Normal - measures of central tendency, dispersion, skewness and kurtosis, recurrence relations based on moments, moment generating function, cumulant generating function, characteristic function, additive property and examples. Exponential distribution – moment generating function and lack of memory. Gamma distribution – moment generating function, cumulant generating function and additive property.

Practicals

List of Practicals: (30 hours)

(Practical to be performed on computer using Microsoft Excel/Electronic Spreadsheet/SPSS/Any Statistical Package)

1. Problems based on expectations, variance and co-variances.
2. Fitting of binomial distributions for n and $p = q = \frac{1}{2}$ and for n and p given.
3. Fitting of binomial distributions computing mean and variance.
4. Fitting of Poisson distributions for given n and λ and after estimating mean.
5. Fitting of suitable distribution.
6. Application problems based on Binomial distribution.
7. Application problems based on Poisson distribution.

8. Problems based on the Area property of Normal distribution.
9. Application problems based on Normal distribution.
10. Problems based on bivariate probability distributions.

Essential Readings

1. Goon, M., Gupta, M.K. and Dasgupta, B. (2003). *An outline of Statistical Theory*, Vol. I, 4th Ed., World Press, Kolkata.
2. Gupta, S.C. and Kapoor, V.K. (2020). *Fundamentals of Mathematical Statistics*, 12th Ed., Sultan Chand and Sons.
3. Hogg, R. V., McKean, J., and Craig, A. T. (2005). *Introduction to mathematical statistics*. Pearson Education.
4. Rohtagi, V.K. and Saleh, A.K. Md. E. (2009). *An Introduction to Probability and Statistics*, 2nd Ed., John Wiley and Sons.

Suggestive Readings

1. Ross, S.A. (2007). *Introduction to Probability Models*, 9 Ed., Academic Press
2. Mood, A.M., Graybill, F.A. and Boss, D.C. (2007). *Introduction to the Theory of Statistics*, 3rd Ed., Tata McGraw Hill Publication.