

Discipline Specific Elective for B.A. (Prog) with Statistics as Non-Major/Major
Semester-VIII

**DISCIPLINE SPECIFIC ELECTIVE COURSE-6A: INTRODUCTION TO
NON-PARAMETRIC METHODS**

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		
Introduction to Non-Parametric Methods	4	3	0	1	Class XII Pass with Mathematics	Knowledge of elementary Statistical Inference

Learning Objectives

Learning objectives include:

- To understand the basic principles and concepts of non-parametric statistics.
- To learn the different types of non-parametric statistical tests and their applications.

Learning Outcomes:

After completion of this course, students should be able to:

- Develop an understanding of the differences between parametric and non-parametric statistical tests and their advantages and disadvantages.
- Apply and interpret the results of various non-parametric tests for hypothesis testing, goodness-of-fit testing, testing for randomness, and measuring the association between variables.

SYLLABUS OF DSE-6A

Theory

UNIT I

(11 hours)

Introduction: Definition of non-parametric statistics, Various scales of measurements – the Nominal or categorical scale, the Ordinal or ranking scale, the interval scale and the ratio scale. The differences between parametric and non-parametric statistical tests. Advantages and disadvantages of non-parametric statistical tests.

UNIT II

(15 hours)

One Sample Tests

One-Sample Tests: Chi-Square Goodness of Fit Test for testing whether a sample comes from a specific distribution; Kolmogorov-Smirnov Test for goodness of fit, One Sample Runs Test for Randomness to test for independence of the order of observations in the sequence. Testing the difference between the median of a sample and a hypothesized value: Sign Test, Wilcoxon Signed-Rank Test.

UNIT III**(19 hours)****K Sample Tests**

Two-Sample Tests: Whether two samples come from the same continuous distribution-Wald-Wolfowitz Runs test, Kolmogorov-Smirnov test. Test for the difference between the medians of two independent samples - Median Test, Mann-Whitney U Test. Comparison of medians of k independent samples - Kruskal-Wallis one-way analysis of variance by ranks. Measure of association between two variables - Spearman Rank-Order correlation coefficient and significance.

PRACTICAL/LABWORK-(30hours)**List of Practical:**

1. Chi-Square Goodness of Fit Test
2. Kolmogorov-Smirnov One Sample Test
3. One Sample Runs Test for Randomness
4. Sign Test
5. Wilcoxon Signed-Rank Test.
6. Wald-Wolfowitz Runs Test
7. Kolmogorov-Smirnov Two-Sample Test
8. Median Test
9. Wilcoxon-Mann-Whitney U Test
10. Kruskal-Wallis one-way analysis of variance by ranks
11. Spearman Rank-Order correlation coefficient

Practical work to be conducted using electronic spreadsheet / EXCEL/ Statistical Software Package/ SPSS/ calculators.

ESSENTIAL READINGS:

- Gun, A. M., Gupta, M. K., & Dasgupta, B. (2022). An outline of statistical theory. World Press Pvt Limited.
- Siegal Sidney, and N. John Castellan 1988. Nonparametric Statistics for the Behavioral Sciences. New York (6).
- Gibbons, J. D., & Chakraborti, S. (2020). Nonparametric statistical inference 6th edition. CRC press.

SUGGESTIVE READINGS:

- Sprent, P., & Smeeton, N. C. (2025). Applied nonparametric statistical methods, 5th edition. CRC press.
- Sheskin, D. J. (2020). Handbook of parametric and nonparametric statistical procedures, 5th edition. CRC Press. Boca Raton, FL.

Note: Examination scheme and mode shall be as prescribed by the Examination Branch University of Delhi, from time to time.