



Sree Narayana Mangalam College Maliankara
(Affiliated to Mahatma Gandhi University, Kottayam)

CERTIFICATE COURSE SYLLABUS

**STATISTICAL TOOLS FOR
RESEARCH METHODOLOGY**

Sree Narayana Mangalam College
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Certificate Course on Statistical Tools for Research Methodology

Objectives of the Course:

- ✓ Provide students with a comprehensive understanding of statistical concepts and methods, covering descriptive statistics, correlation and regression, probability distributions, sampling methods, sampling distributions, and inferential statistics.
- ✓ Develop students' proficiency in analyzing and interpreting data using descriptive statistics, understanding and applying correlation and regression techniques to explore relationships between variables, gaining a solid grasp of probability distributions to model uncertainty in real-world scenarios, learning various sampling methods and their implications for data collection, and finally, mastering inferential statistics to draw accurate conclusions about larger populations based on sample data.
- ✓ Equip students with the necessary analytical skills to make data-driven decisions, conduct meaningful research, and effectively communicate statistical findings to a wide audience.

Course Overview:

The course is designed to equip students with the essential statistical knowledge and skills required for conducting meaningful research across various disciplines. The course covers a wide range of topics, including descriptive statistics, correlation and regression, sampling methods and hypothesis testing. By the end of the course, students will be well-prepared to apply statistical tools effectively in their research endeavors and contribute to the advancement of knowledge in their respective fields.

Duration of the course: 30 Hours (30 Hours Theory)

Module 1: Descriptive Statistics

Measures of central tendency-Arithmetic Mean, Median, Mode

Measures of dispersion- Range, Quartile deviation, Standard deviation **(5 Hours)**

Module 2: Correlation & Regression

Correlation-Scatter diagram, Karl Pearson's coefficient of correlation, spearman's rank correlation coefficient. Regression-Finding regression equations, regression coefficients, prediction based on regression equations. **(5 Hours)**

Module 3: Probability distributions

Binomial distributions, Poisson distribution, Normal distribution and their applications **(5 Hours)**

Module 4: Sampling methods & sampling distributions

Sampling methods: Population and sample, Probability and non-probability sampling methods, determination of sample size

Sampling distributions: Chi square, t and F distributions-definition, properties and tables of distribution **(5 Hours)**

Module 5: Inferential Statistics

Estimation: Parameter and statistic, Estimation of parameters-Point estimation and interval estimation.

Testing of Hypothesis: Hypothesis- Simple and composite hypothesis, Null and alternative hypothesis, Rejection & Acceptance region, Type I and type II errors, significance level, power of a test, p value of a test.

Parametric tests- testing mean, testing equality of means, paired t test, Testing variance, testing equality of variances , ANOVA

Non Parametric tests-Chi square test of independence and goodness of fit, sign test, Wilcoxon's Signed rank test , median test, Mann-Whitney U test, Kruskal Wallis test **(10 Hours)**

Suggested Readings

1. C R Kothari (2004) Research Methodology: Methods and Techniques. 2nd Revised Ed, New Age International Publishers.
2. Gupta, S.C. and Kapoor, V.K. (2014), Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
3. Mendenhall William, Beaver J. Robert and Beaver M. Barbara (2014). Introduction to Probability and Statistics-12th Ed, Thomson Books/Cole publishers
4. Sheldon M Ross (2016). Introductory Statistics, 7th Ed, Associate Press