

St Joseph's College (Autonomous)
Bangalore

Department of Statistics

Open elective syllabus
for
I Semester

Batch (2021 Onwards)

Statistical Methods

Course Objectives

1. This is an open elective course for other than statistics students.
2. The students will learn the elements of descriptive statistics, probability, statistical methods such as tests of hypotheses, correlation and regression.

Course Pre-requisite: II PUC or equivalents with Mathematics

Course Outcomes

Upon the completion of this course students should be able to

- CO1: Acquire knowledge of statistical methods.
- CO2: Identify types of data and visualization, analysis and interpretation.
- CO3: Know about elementary probability and probability models.
- CO4: Employ suitable test procedures for given data set.

Pedagogy

The course is taught using traditional chalk and talk method using problem solving through examples and exercises. Students are encouraged to use resources available on open sources.

Unit 1: Introduction

10 Hours

Definition and scope of Statistics. Data: quantitative and qualitative, attributes, variables, scales of measurement - nominal, ordinal, interval and ratio. Presentation: tabular and graphic, including histogram and ogives. Concepts of statistical population and sample. Sampling from finite population - Simple random sampling, Stratified and systematic random sampling procedures (definitions and methods only). Concepts of sampling and non-sampling errors.

Unit 2: Univariate and Bivariate Data Analysis

10 Hours

Measures of Central Tendency: mathematical and positional. Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, coefficient of variation, moments, skewness and kurtosis.

Bivariate data, scatter diagram, Correlation, Karl-Pearson's correlation coefficient, Rank correlation. Simple linear regression, principle of least squares and fitting of polynomials and exponential curves.

Unit 3: Probability and Distributions

12 Hours

Probability: Random experiment, trial, and sample space, events-mutually exclusive and exhaustive events. Classical, statistical and axiomatic definitions of probability, addition and multiplication theorems, Bayes theorem (only statements). Discrete and continuous random variables, probability mass and density functions, distribution functions, expectation of a random variable. Standard univariate distributions: Binomial, Poisson and Normal distributions (Elementary properties and applications only).

Unit 4: Sampling Distributions and Testing of Hypothesis

10 Hours

Distribution of sample mean from a normal population, Chi-square, t and F distributions (No derivations) and their applications.

Statistical Hypothesis - null and alternative hypothesis, simple and composite hypothesis. Type-I and Type-II errors, level of significance, critical region, P-value and its interpretation.

Test for single mean, equality of two means, single variance, and equality of two variances for normal populations.

References

1. Daniel, W. W. (2007) Biostatistics - A Foundation for Analysis in the Health Sciences, Wiley
2. T.W. Anderson and Jeremy D. Finn(1996). The New Statistical Analysis of Data, Springer.
3. Mukhyopadyaya P(1999). Applied Statistics, New Central book Agency, Calcutta.
4. Ross, S.M.(2014) Introduction to Probability and Statistics For Engineers and Scientists.
5. Cochran, W G (1984): Sampling Techniques, Wiley Eastern, New Delhi

