

STATISTICAL METHODS

(Common to CSE(AI & ML) and CSE(DS))

Course Code: 22BM1109

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COURSE OUTCOMES:

At the end of the Course the student shall be able to

CO1: analyze statistical data using measures of central tendency (L4)

CO2: determine the mean and variance of discrete and continuous random variables (L3)

CO3: calculate probabilities using normal distribution and construct sampling distribution of means (L3)

CO4: measure the confidence interval for the mean of a population and test a hypothesis concerning means (L5).

CO5: test a hypothesis concerning variances and proportions (L5)

UNIT-I

10 Lectures

Descriptive Statistics:

Introduction, Collection and Classification of data, Measures of central tendency and measures of dispersion, Coefficient of variation (Relation between measures of dispersion), Standard Deviation of combination of two groups, Moments, Skewness and kurtosis (Sections 25.1-25.2, 25.5-25.11 of textbook 1)

Learning Outcomes: At the end of this unit, the student will be able to

1. calculate the measures of the center of data: mean, median, and mode (L3).
2. describe, the measures of the spread of data: variance, standard deviation (L2).
3. differentiate skewness with measures of central tendency (L2).

UNIT-II

10 Lectures

Random Variables:

Review of probability concepts, Random variables, types of random variables, probability distribution function, probability density function, the mean and variance of a probability distribution, Binomial distribution, Poisson distribution, Normal distribution: calculating normal probabilities, normal approximation to the binomial distribution. (Sections 4.1, 4.2, 4.4, 4.6, 5.1-5.3 of textbook 2)

Learning Outcomes: At the end of this unit, the student will be able to

1. determine the mean and variance of a random variable (L3)
2. calculate the probabilities using density and distribution function (L3)
3. interpret the properties of the normal distribution and its applications (L2)

UNIT-III

10 Lectures

Sampling Distributions:

Population and sample, sampling distribution of the mean (σ known), sampling distribution of the mean (σ unknown), sampling distribution of the variance: Chi-square and F-distributions. (Sections 6.1-6.4 of textbook 2)

Learning Outcomes: At the end of this unit, the student will be able to

1. determine the mean and variance of a sampling distribution of means (L3)
2. discuss the sampling distribution of the means and variances (L2)
3. interpret the properties of Chi-square and F distributions (L2)

UNIT-IV

10 Lectures

Estimation and Test of Hypothesis of Means:

Point estimation, interval estimation, test of hypothesis, hypothesis concerning one mean, hypothesis concerning two means, matched pair comparisons. (Sections 7.1, 7.2, 7.4-7.6, 8.2- 8.4 of textbook 2)

Learning Outcomes: At the end of this unit, the student will be able to

1. calculate the confidence interval for the mean of a population (L3)
2. discuss the test of a hypothesis concerning population mean (L2)
3. test a hypothesis concerning two means (L5)

UNIT-V

10 Lectures

Estimation and Test of Hypothesis of Variances and Proportions:

Estimation of variance, hypothesis concerning one variance, hypothesis concerning two variances, estimation of proportion, hypothesis concerning one proportion, hypothesis concerning several proportions (Sections 9.1- 9.3, 10.1 – 10.3 of textbook 2)

Learning Outcomes: At the end of this unit, the student will be able to

1. calculate the confidence interval for the variance and the proportion of a population (L3)
2. discuss the test of a hypothesis concerning population variance (L2)
3. test a hypothesis concerning proportions (L5)

Text Books:

1. B. S. Grewal, “*Higher Engineering Mathematics*”, 44th edition, Khanna Publishers, 2017.
2. Richard A. Johnson, “*Miller & Freund’s Probability and Statistics for Engineers*”, 8th edition, PHI Learning India Private Limited, 2011

References:

1. S. Ross, *A First Course in Probability*, Pearson Education India, 2002.
2. W. Feller, *An Introduction to Probability Theory and its Applications*, 1st edition, Wiley, 1968.

Web References:

1. <https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-ma08/>
2. <https://nptel.ac.in/courses/111/105/111105090/>