

SYALLBUS FOR AUTONOMY

STATISTICS

SEMESTER I

COURSE : S.STA.1.02

STATISTICAL METHODS (A)

[45 LECTURES]

LEARNING OBJECTIVES :

To study : 1) concept of probability
2.) probability distribution
3.) testing of hypotheses.

1. Unit 1 : Elementary probability theory. [15 Lectures]

Random Experiment, Sample Point & Sample Space.
Discrete Sample Space, Definition of Event, Elementary Event, Algebra of Events.
Mutually exclusive events, Exhaustive events. Subjective Probability.
Classical, Empirical and Axiomatic definitions of probability.
Conditional Probability, Independence of n Events. ($n = 2, 3$).
Theorems on Addition & Multiplication of Probabilities,
Bayes' Theorem (All theorems with proofs).

2. Unit 2 : Discrete Random variable: [15 Lectures]

Univariate :

Random variable. Definition, Properties of Probability Mass Function & Cumulative Distribution Function. Expectation and variance of a random variable. Theorems on Expectation and Variance .

Raw & Central Moments and their relationship (without proof). Concept of Skewness and Kurtosis.

Bivariate :

Joint Probability Mass Function of two Discrete Random Variables, Marginal and Conditional Probability Distributions, Independence of Two Random Variables.

Theorems on Expectation, Variance.

Covariance, Correlation coefficient between two random variables

3. Unit 3 : Standard Discrete Probability Distributions: [15 Lectures]

Degenerate distribution, Bernoulli distribution, Binomial Distribution, Poisson Distribution, Hypergeometric Distribution. Uniform Distribution Derivation of mean, & variance, Calculation of Expected frequencies.

Poisson and Hypergeometric approximation to Binomial Distribution (statement only)

CIA Best 2 out of 3 Internal Tests.

SEMESTER II

COURSE : S.STA.2.02

STATISTICAL METHODS (B)

[45 LECTURES]

LEARNING OBJECTIVES :

To study : 1.) concept of probability
4.) probability distribution
5.) testing of hypotheses.

Unit 4 : Continuous Random variable

(15 L)

Concept and properties of Probability Density Function and Cumulative Probability distribution Function. Expectation and variance of a random variable and its properties. Measures of location, dispersion, skewness and kurtosis. Raw and Central Moments. (Simple illustrations.)

Unit 5 : Some Standard Continuous Probability Distributions. (15 L)

Rectangular Distribution, Exponential Distribution and Normal Distribution. Derivation of mean, median and variance for Rectangular and Exponential distribution. Properties of Normal Distribution and Normal Curve (without proof). Normal Approximation to Binomial and Poisson Distributions (without proof). and using graph / probability histogram

Unit 6 : Sampling Distribution.

(15 L)

Concept of Parameter, Statistic, Estimator and bias. Sampling distribution of estimator. Standard error and M.S.E. of an estimator.

Central Limit Theorem (Statement only).

Sampling distribution of sample mean and sample proportion for large samples.

Point and interval estimation of single mean and single proportion, for large sample only.

Statistical tests - Concept of Hypotheses. (Null and Alternative Hypotheses.).

Types of Errors, Critical Region, Level of Significance, p-value,

Large Sample Tests using Central Limit Theorem, if necessary.

- For testing specified value of population mean
- For testing specified value in difference of two population means
- For testing specified value of population proportion
- For testing specified value in difference of two population proportions.

CIA Best 2 out of 3 Internal Tests.

TOPICS FOR PRACTICALS.

SEM-I

1. Probability
2. Discrete Random Variable
3. Bivariate Probability Distributions.
4. Binomial, Poisson and Hypergeometric Distributions.
5. Calculation of Expected frequency from a conducted experiment.

SEM-II

6. Continuous Random Variables.
7. Uniform, Exponential Distributions.
8. Normal Distribution
9. Testing of Hypotheses
10. Estimation
11. Large Sample Tests.

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5. Probability and Statistical Inference : Hogg R.V, Tanis E.P. – Macmillan Publishing Co. Inc.
6. Fundamentals of Mathematical Statistics : S. C. Gupta, V.K.Kapoor – Sultan Chand & Sons. Eleventh edition.
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10. Prem . S. Mann (2007) . Introductory Statistics (6th edition) John Wiley & Sons.
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