Syllabus

For B.A 4th Semester Courses in Statistics
(June 2018 onwards)

Contents:

S.Y. B.A. _ Statistics **Course: ASTA0401**
Title: Statistical Methods (B)

Course Objectives:
To study: 1) Continuous probability distributions
2) Testing of hypotheses.
Number of lectures: 45

Course Outcomes:

On completion of the course the learner should be able to:

1. Students are able to identify some basic continuous distributions and are cognizant of their properties**.**
2. Students are knowledgeable about the theoretical Normal distribution, its properties and uses.
3. Students are knowledgeable in general about the concept of 'Testing of Hypothesis' and in particular for 'Test of hypothesis for Large Samples'.

Unit 1: 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 2: 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 3: Sampling Distribution. **(15L)**

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.

List of Recommended Reference Books:

1. Statistical Methods: Welling, Khandeparkar, Pawar, Naralkar Manan Publications. First edition.
2. Statistical Methods: R.J. Shah – Seth Publications. Tenth edition.
3. Basic Statistics: B.L. Agarwal – New Age International Ltd. Fifth edition
4. Theory and Problems of Statistics: Spiegel M.R. – Schaums Publishing Series, Tata Mcgraw - Hill. First edition
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.
7. Statistical Methods: S.P. Gupta – Sultan Chand & Sons. Thirty third edition.
8. Fundamentals of Statistics, Volume II, - Goon A.M., Gupta M.K., Dasgupta B. – The World Press Pvt. Ltd, Calcutta. Fifth edition.
9. Richard. I. Levin, David S. Rubin: Statistics for Management Fifth edition
10. Prem. S. Mann (2007). Introductory Statistics (6^{th} edition) John Wiley & Sons.
11. Allan Bluman (2009) Introductory Statistics. A step-by-step approach (7^{th} edition). McGraw-Hill

TOPICS FOR PRACTICALS.

1. Continuous Random Variables.
2. Uniform, Exponential Distributions.
3. Normal Distribution
4. Testing of Hypotheses
5. Estimation
6. Large Sample Tests.

Evaluation (Theory):

Total marks per course - 100.
CIA- 40 marks
CIA 1: Written test -20 marks
CIA 2: Written test -20 marks
End Semester Examination – 60 marks
One question from each unit for 20 marks, with internal choice.
Total marks per question with choice – 25 to 30

Evaluation of ASTA04PR (0401)

Total marks - 50.
Group Project – 15 marks
Journal – 5 marks.
End Semester Practical Examination – 30 marks.

Grid Template - End Semester Examination (Theory)

Q. No	Knowledge (Definition, Descriptive Notes, Theoretical Proofs)	Understanding & Application (Illustration/Numerical Problems)	Marks
1.	15	05	20
2.	15	05	20
3.	15	05	20
Total	45	15	60
Weightage (%)	75%	25%	100%

S.Y. B.A. _ Statistics **Course: ASTA0402**
Title: Data Analysis

Course Objectives:

1. Techniques for data collection and its analysis.
2. Basic techniques of forecasting.

Number of lectures: 45

Course Outcomes:

1. Students are aware of various Sampling techniques (method , merits and limitations)
2. Students are knowledgeable about methods to study the independence/association between qualitative variables. (Chi-Square test, Yule's coefficients, Odds Ratio)
3. Students have gained programming skills using R-software and have been introduced to its applications

Unit 1 Sampling: **(15 L)**

Concepts of population, population unit, sample, sample size, parameter, statistic, estimator, unbiasedness, bias, mean square error (M.S.E.) and standard error.
Census and Sample Surveys:
Steps in conducting sample survey
Concepts of Sampling errors and non-sampling errors.
Concepts of non-probability sampling and probability sampling.
Sampling with replacement: Sampling without replacement.
Simple random sample (SRS)
Drawing Simple random sample (SRS) using
(a) Lottery Method and (b) Random numbers
Estimation of Population mean
Introduction to: Stratified sampling, Systematic sampling, Cluster sampling, Two stage sampling.
Application to Market Research in various fields.
NSSO, CSO and their functions.

Unit 2: Application of chi-square distribution & measures of association **(15 L)**

Definition of Chi-square distribution.
Applications of chi-square distribution:
(1) Test of significance for specified value of variance from a normal population
(2) Test of goodness of fit
(3) Independence of Attributes for:
(i) 2 x 2 contingency table. (With Derivation of Test statistic)
(ii) r x c contingency table (Without Derivation of Test statistic)
Measures of association
(i) Yule's coefficient (ii) Coefficient of Colligation (iii) Phi-coefficient
Prospective study and retrospective study
Relative risk & Odds ratio.

Unit 3: Applications using R software **(15 L)**

Introduction to R. Creation of vectors using various functions.
Arithmetic operations of vectors. Accessing vectors. Various numerical functions. Creation of data frames. Subset and Transform commands.
Import CSV file into R. Computing various measures of central tendency, dispersion, skewness and kurtosis.
Computing pdf, cdf, quantile points.
Drawing a random sample from discrete and continuous distributions.
Correlation and Regression with one independent variable.

List of Recommended Reference Books:

1. S.C.Gupta and V.K. Kapoor: Fundamentals of Applied Statistics Sultan.Chand Publication, 3rd edition
2. Cochran: Sampling Techniques, Wiley Publication, 3rd edition
3. Naresh Malhotra: Market Research, 5th edition
4. Kothari C.R.: Quantitative Techniques, Wiley Eastern Limited ,5th edition
5. R.J Shah: Statistical Methods,10th edition, Sage publications.
6. S.C.Gupta, V.K.Kapoor: Fundamentals of Mathematical Statistics, 11th Edition Sultan Chand & Sons.
7. Vishwas R. Pawgi & Saroj A. Ranade: Statistical Methods Using R Software 1st edition, Nirali Prakashan.
8. Michael J. Crawley: The R Book, 2nd edition, Wiley Publications

TOPICS FOR PRACTICALS:

1. Sampling Techniques
2. Chi-Square distribution.
3. Practical using R.

Evaluation (Theory):
Total marks per course - 100.
CIA- 40 marks
CIA 1: Written test -20 marks
CIA 2: Written test -20 marks
End Semester Examination – 60 marks
One question from each unit for 20 marks, with internal choice.
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Evaluation of ASTA04PR (0401)
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Weightage (%)	75%	25%	100%

S.Y.B.A_ Statistics **Course: ASPC0401 DS**
Title: Descriptive Statistics

Course Objectives :
To orient students in techniques of Data Analysis.

Number of lectures : 45

Course Outcomes: On completion of the course the learner should be able to:
1. Understand and apply various techniques of data collection and presentation.
2. Have the knowledge of the various summary measures of location (averages) used for data analysis and the basis for their selection.
3. Select appropriate methods to present data.
4. Select and calculate appropriate averages to represent data sets.
5. Select and calculate appropriate measures of dispersion for data sets.

Unit 1: Data Types, Collection and Management. (11 L)

Types of data from a population:

Qualitative and Quantitative data; Geographical, Time series data; Discrete and Continuous data,

Different types of scales: Nominal, Ordinal, Ratio and Interval.

Concepts of statistical population and sample.

Primary data- Idea of questionnaire / schedule, with its merits and demerits.

Secondary data– its major sources including some government publications.

Elementary Categorical Data Analysis

Preparation of tables with two or three factors (variable /attributes) of classification. Requisites of a good table. Independence and Association for 2 attributes in a 2 x 2 table using Yule's coefficient of association.

Unit 2: Presentation of Data (11 L)

Frequency distribution of discrete and continuous variables.

Cumulative frequency distribution.

Graphical representation of frequency distribution by Histogram, Frequency polygon, Frequency curve and Ogives. Stem and Leaf display

Diagrammatic representation using Bar diagrams and Pie chart.

Unit 3: Measures of Central Tendency or Location. (11 L)

Arithmetic mean and its properties (simple and weighted), Combined mean.

Quantiles (Median, Quartiles, Deciles, Percentiles.) Mode.

Empirical relationship between mean, median and mode.

Merits, Demerits and Uses of Mean, Median, Mode.

Requisites of a good average.

Choice of scale of measurement for each measure of central tendency.

Unit 4: Absolute and Relative Measures of Dispersion. (12 L)

Range, Interquartile Range, Quartile Deviation, Standard Deviation (Variance) and their relative measures. Combined variance.
Measures of Skewness and concept of Kurtosis.
Box-Whisker Plot.
Simple Linear Correlation
Bivariate Data, Scatter diagram, Product moment correlation coefficient and its properties.
Rank correlation- Spearman's measure.

List of Recommended Reference Books.

1. Goon A.M, Gupta M.K, Dasgupta B, Fundamentals of Statistics, Vol 1, The World Press Private Ltd, Calcutta, fifth edition.
2. Kothari, C.R: Research Methodology, Methods and Techniques, Willey Eastern Ltd, First Edition.
3. Shah R.J, Descriptive Statistics, Seth Publications, Eighth Edition.
4. Spiegel, M.R, Theory and Problems of Statistics, Schaum's Publishing Series, Tata McGraw-Hill, First Edition.
5. Welling, Khandeparkar, Pawar, Naralkar, Descriptive Statistics, Manan Publication.

Evaluation (Theory):
Total marks per course - 100.
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