

# SAURASHTRA UNIVERSITY



Re-Accredited Grade B by NAAC  
Grade A

## FACULTY OF SCIENCE

SYLLABUS FOR  
Bachelor of Science

(Statistics)

(Semester- III & IV)

**According to Choice Based Credit System**  
**Effective from June – 2020**

**B.Sc. (Statistics)**  
**Semester-III**  
**Subject Code : 301(A)**  
**Subject Name: Statistical Method-III**

**Objective:** The course aims to provide an understanding of application of statistics to business and industries while focusing to develop effective business communication skills among the students.

**Key features:** To make them aware about Statistical Methods application in the real life.

**Course duration: Theory:** 60 hours, 6 hours a week.

**Credit: 4**

**Practical:** 6 hours a week

**Credit: 3**

Unit No.	Topic	Hours	Marks
I	<p><b><u>Probability Theory:</u></b>            Concept of permutation and combination. Formula for <math>{}_nP_r</math> and <math>{}_nC_r</math> (without proof). Simple example based on permutation and combination.            Introduction of probability, Terminology used in probability, Definitions of Probability (Mathematical, Statistical and Axiomatic), Odds in favour and odds against, Additive and Multiplicative rule of Probability, Conditional Probability, Baye's Theorem and its applications. Simple examples based on Probability.</p>	10	14
II	<p><b><u>Random Variable:</u></b>            Definition of Random variable            Distribution function and its property, Probability mass function, Probability density function.  <b><u>Mathematical Expectation:</u></b>            Definition, Properties, Addition and Multiplication theorem and Simple Example.  <b><u>Moment :</u></b>            Row, Central and Factorial Moment, Moment generating function and Cumulants, Skweness and kurtosis. Bivariate distribution and its row moments, central moments, marginal and conditional distribution based on Random variable. Simple examples</p>	10	14
III	<p><b><u>Probability Distribution-I:</u></b>            Concept of Bernoulli distribution and its mean and variance.            Binomial distribution: Its derivation, moments, recurrence relation for the moments, factorial moments, mode, moment generating function, additive property, cumulative probability generating function. Simple examples</p>	10	14
IV	<p><b><u>Probability Distribution-II:</u></b>            Poisson distribution: Its derivation (limiting case binomial distribution), moments, recurrence relation for the moments, mode cumulants, moment generating function, additive and reproductive property of independent Poisson variate, probability generating function. Simple examples</p>	10	14

<b>V</b>	<p><b><u>Probability Distribution-III:</u></b>          Negative Binomial distribution: Its derivation, its mean and variance only, moment generating function, cumulants, Poisson distribution as a limiting case of Negative Binomial distribution, probability is generating function. Simple Example.          Geometric distribution: Its derivation, its mean and variance only, Moment generating function. Simple Example.          Hyper Geometric distribution: Its derivation, its mean and variance only, factorial moments, approximation to Binomial distribution. Simple Example.</p> <p><b><u>Theoretical Continuous Distribution</u></b>          Normal distribution: Definition, Characteristics, Normal Distribution as a Limiting form of Binomial Distribution, Mode, Median, Moment generating function, Cumulants, Moments. Simple Example.</p>	<b>10</b>	<b>14</b>
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**B.Sc. (Statistics)**  
**Semester-III**  
**PRACTICAL**  
**Subject Code: 301(B)**  
**Subject Name: Statistical Method-III**

- Example based on Probability (Baye's Theorem)
- Example based on Random variable (Skweness and kurtosis)
- Fitting of Binomial distribution
- Fitting of Poisson distribution
- Fitting of Negative-Binomial distribution
- Fitting of Geometric distribution
- Example based on Hyper Geometric distribution
- Fitting of Normal distribution

**B.Sc. (Statistics)**  
**Semester-IV**  
**Subject Code: 401(A)**  
**Subject Name: Statistical Method-IV**

**Objective:** The course aims to provide an understanding of application of statistics to business and industries while focusing to develop effective business communication skills among the students.

**Key features:** To make them aware about Statistical Methods application in the real life.

**Course duration: Theory:** 60 hours, 6 hours a week.

**Credit: 4**

**Practical:** 6 hours a week

**Credit: 3**

Unit No.	Topic	Hours	Marks
<b>I</b>	<p><b><u>CORRELATION (FOR TWO VARIABLE):</u></b>            Concept of correlation-correlation coefficient, properties, Scatter diagram method, Karl Pearson's Coefficient of Correlation, Spearman's Rank Correlation Coefficient, Coefficient of Concurrent deviation, Coefficient of determination and its interpretation, Calculation of Correlation for Bivariate. Calculation of simple example.</p>	<b>10</b>	<b>14</b>
<b>II</b>	<p><b><u>REGRESSION(FOR TWO VARIABLE):</u></b>            Concept of Regression and regression coefficient, Lines of Regression and its properties, Angle between two line of regression, Difference between Correlation analysis and Regression analysis. Calculation of Simple example</p> <p><b><u>ASSOCIATION OF ATTRIBUTES:</u></b>            Meaning, Notations, Consistency of data, Types of association, Methods of studying association (Method of comparison of observe and expected, Proportion method, Yule's method). Calculation of Simple example.</p>	<b>12</b>	<b>14</b>
<b>III</b>	<p><b><u>TEST OF SIGNIFICANCE:</u></b>            Basic concepts: Hypothesis, Null Hypothesis, Alternative Hypothesis, Statistic, Parameter, Sampling Distribution, Standard Error, Type I and Type II errors, Level of Significance, Acceptance Region, Critical Region, One-tailed test, Two-tailed test, Estimation of Confidence Interval and Determination of optimum sample size, Degrees of freedom, Testing Procedure. Statement of Law of large number, Statement of Central limit theorem. Difference between large sample and small sample.</p> <p><b><u>TEST OF SIGNIFICANCE (LARGE SAMPLE):</u></b>            Test for Attributes: Test significance for single sample proportion, Test of significance of difference between two sample proportions. Calculation of Simple example.            Test for Variables: Test significance of a single mean, Test of significance of difference between two means, Test of significance for differences of two standard deviations. Calculation of Simple example.</p>	<b>12</b>	<b>14</b>

<b>IV</b>	<p><b><u>t-Test:</u></b> Applications of t-Test and statement of probability distribution function only. Test of significance of single mean, Paired t-test for the difference of means. Test of significance concerning correlation coefficient. Calculation of Simple example.</p> <p><b><u>CHI-SQUARE TEST:</u></b> Definition of Chi-Square Variate and Statement of probability distribution function only, Conditions for the validity of Chi-square test, Test of goodness of fit, Test Independence of Attributes, Test of Population Variance. Calculation of Simple example.</p>	<b>10</b>	<b>14</b>
<b>V</b>	<p><b><u>F-test</u></b> Applications of F-test and statement of probability distribution function only. Calculation of Simple example. Fisher's transformation. Fisher's-Z Test of significance of correlation coefficient. Calculation of Simple example.</p> <p><b>Analysis of variance</b> Model and assumptions Derivation of analysis of variance for one-way classification (with fixed effect models). Derivation of analysis of variance for two-way classification (with fixed effect models). Calculation of Simple example (One way and two-way classification).</p>	<b>08</b>	<b>14</b>

**B.Sc. (Statistics)**  
**Semester-IV**  
**PRACTICAL**  
**Subject Code: 401(B)**  
**Subject Name: Statistical Method-IV**

- Calculation of Correlation Coefficient, Rank Correlation Coefficient, Regression Coefficient, Regression Lines.
- Applications of t-test
- Applications of Chi-square Test (Independence, Goodness of Fit, Population)
- Large Sample Test:  
Test for Attributes: Test significance for single sample proportion, Test of significance of difference between two sample proportions.  
Test for Variables: Test significance of a single mean, Test of significance of difference between two means, Test of significance for differences of two standard deviations.
- Application of F-test
- ANOVA for one-way and two-way classification(with fixed effect models)

<b>THEORY</b>	
<b>100 MARKS</b>	
Marks for External Examination:	(Short Questions) → 20 Marks (Descriptive type) → 50 Marks <hr style="width: 50%; margin-left: auto; margin-right: 0;"/> Total Marks → <b>70 Marks</b>
Marks for Internal Examination:	Assignments and Test → <b>30 Marks</b>

### **Format of External Question Paper**

<ul style="list-style-type: none"> <li>• There shall be <b>FIVE</b> questions from each unit of <b>14</b> marks each.</li> <li>• Each Question will be of the following form.</li> </ul>		
Question	(A) Answer any four out of four (Short answer type question)	4 Marks
	(B) Answer any one out of two	2 Marks
	(C) Answer any one out of two	3 Marks
	(D) Answer any one out of two	5 Marks
<b>TOTAL</b>		<b>14 Marks</b>

<b>PRACTICAL</b>	
<b>50 MARKS</b>	
Marks for External Examination:	(Examples) → 27 Marks (Via-voce and Practical Journals) → 08 Marks <hr style="width: 50%; margin-left: auto; margin-right: 0;"/> Total Marks → <b>35 Marks</b>
Marks for Internal Examination:	<b>15 Marks</b>

## REFERENCE BOOKS:

1. Gupta S. C. & Kapoor V. K. : Fundamental of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. Gupta S. C. & Kapoor V. K. : Fundamental of Applied Statistics, Sultan Chand & Sons, New Delhi.
3. Gupta A. C. : Fundamental of Applied Statistics, Sultan Chand & Sons, New Delhi.
4. Kenny & Keeping : Mathematics of Statistics Volume I and II, Van Nostran.
5. Goon Gupta & Dasgupta: Fundamental of Statistics Volume I and II, World Press, Calcutta.
6. Speigal M. R. : Theory and Problems of Statistics, McGraw Hill Book Co., London.
7. Shenoy G. V., Srivastava U. K. & Sharma S. C. : Business Statistics, Wiley Eastern.
8. Das G. & Pattnayk : Fundamentals of Mathematical Analysis, Tata McGraw Hill, New Delhi.
9. D. N. Elhance (1956) : Fundamentals of Statistics Kitab Mahal, Allahabad.
10. D. C. Shancheti and V. K. Kapoor: Statistics ( Theory and Application), Sultan Chand & Sons Publication, New Delhi.
11. Meyer P. L. (1970): Introductory Probability and statistical application, Addison Wesley.
12. Degoot M. H.(1975): Probability and Statistics, Addison Wesley.
13. Mood A. M. Graybill F. A. and Bose D. C. (1974): Introduction to the theory of Statistics, McGraw Hill.
14. Rohtagi V. K. (1986): An introduction to probability theory and Mathematical statistics, Wiley Eastern.
15. Jain D. R. & Bharat Jhunjunwala: Business Statistics, S. Chand & Company.
16. Bharat Jhunjunwala: Business Statistics, S. Chand & Company
17. Mahajan Kalpana K. & Mahajan Ravi K.: Fundamental Statistics in Question, Deep & Deep Publication.
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19. Essential Ms-Word 2000: Mamel, B. P. B. Publication.
20. Ms-Word 2000 No experience required-Davis, B. P. B. Publication.