SAURASHTRA UNIVERSITY

Re-Accredited Grade B by NAAC
Grade A

FACULTY OF SCIENCE

SYLLABUS FOR
Bachelor of Science
(Statistics)
(Semester- III & IV)
**B.Sc. (Statistics)**  
**Semester-III**  
**Paper: Statistics-301**

**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.  
Practical: 6 hours a week

<table>
<thead>
<tr>
<th>Unit No.</th>
<th>Topic</th>
<th>Hours</th>
<th>Marks</th>
</tr>
</thead>
</table>
| I       | **Probability Theory:**  
Concept of permutation and combination. Formula for \(_nP_r\) and \(_nC_r\) (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. | 10 | 14 |
| II      | **Random Variable:**  
Definition of Random variable  
Distribution function and its property, Probability mass function, Probability density function.  
**Mathematical Expectation:**  
Definition, Properties, Addition and Multiplication theorem and Simple Example.  
**Moment:**  
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 | 10 | 14 |
| III     | **Probability Distribution-I:**  
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 | 10 | 14 |
| IV      | **Probability Distribution-II:**  
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 | 10 | 14 |
<table>
<thead>
<tr>
<th>V</th>
<th>Probability Distribution-III:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>Geometric distribution: Its derivation, its mean and variance only, Moment generating function. Simple Example.</td>
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<tr>
<td></td>
<td>Hyper Geometric distribution: Its derivation, its mean and variance only, factorial moments, approximation to Binomial distribution. Simple Example.</td>
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<td></td>
<td><strong>Theoretical Continuous Distribution</strong></td>
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<tr>
<td></td>
<td>Normal distribution: Definition, Characteristics, Normal Distribution as a Limiting form of Binomial Distribution, Mode, Median, Moment generating function, Cumulants, Moments. Simple Example.</td>
</tr>
</tbody>
</table>

**B.Sc. (Statistics)**

**Semester-III (PRACTICAL)**

- 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
Paper: Statistics-401

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

<table>
<thead>
<tr>
<th>Unit No.</th>
<th>Topic</th>
<th>Hours</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>CORRELATION (FOR TWO VARIABLE):</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>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.</td>
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<tr>
<td>II</td>
<td>REGRESSION (FOR TWO VARIABLE):</td>
<td>12</td>
<td>14</td>
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<td></td>
<td>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</td>
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<td>ASSOCIATION OF ATTRIBUTES:</td>
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<td></td>
<td>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</td>
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</tr>
<tr>
<td>III</td>
<td>TEST OF SIGNIFICANCE:</td>
<td>12</td>
<td>14</td>
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</tbody>
</table>
IV | **TEST OF SIGNIFICANCE (LARGE SAMPLE):**
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 difference of two standard deviation. Calculation of Simple example.

V | **CHI-SQUARE TEST:**
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.

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**B.Sc. (Statistics)**  
**Semester-IV (PRACTICAL)**

- Calculation of Correlation Coefficient, Rank Correlation Coefficient, Regression Coefficient, Regression Lines.
- Applications of t-test and Application of F-test
- **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 difference of two standard deviation.
- Applications of Chi-square Test (Independence, Goodness of Fit, Population)
## THEORY

<table>
<thead>
<tr>
<th>Marks for External Examination:</th>
<th>(Short Questions) → 20 Marks</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>(Descriptive type) → 50 Marks</td>
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<tr>
<td><strong>Total Marks</strong></td>
<td><strong>70 Marks</strong></td>
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</tbody>
</table>

| Marks for Internal Examination: | Assignments and Test → 30 Marks |

### Format of External Question Paper

- There shall be **FIVE** questions from each unit of **14** marks each.
- Each Question will be of the following form.

<table>
<thead>
<tr>
<th>Question</th>
<th>(A) Answer any four out of four (Short answer type question)</th>
<th>4 Marks</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>(B) Answer any one out of two</td>
<td>2 Marks</td>
</tr>
<tr>
<td></td>
<td>(C) Answer any one out of two</td>
<td>3 Marks</td>
</tr>
<tr>
<td></td>
<td>(D) Answer any one out of two</td>
<td>5 Marks</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>14 Marks</strong></td>
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## PRACTICAL

<table>
<thead>
<tr>
<th>Marks for External Examination:</th>
<th>(Examples) → 27 Marks</th>
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<tbody>
<tr>
<td></td>
<td>(Via-voce and Practical Journals) → 08 Marks</td>
</tr>
<tr>
<td><strong>Total Marks</strong></td>
<td><strong>35 Marks</strong></td>
</tr>
</tbody>
</table>

| Marks for Internal Examination: | **15 Marks** |

REFERENCE BOOKS: