



Hindi vidya Prachar Samiti's
Ramniranjan Jhunjhunwala College
of Arts, Science & Commerce
(Autonomous College)

Affiliated to
UNIVERSITY OF MUMBAI

Syllabus for the F.Y.B.Sc.

Program: B.Sc. Statistics

Program Code: RJSUSTA

Choice based Credit System (CBCS)

With effect from the academic year 2018-19

F.Y.B.Sc. STATISTICS Syllabus
Credit Based and Grading System

To be implemented from the Academic year 2018-2019

SEMESTER I

Learning Objectives:

- To orient students about the technique of data analysis.
- To introduce the techniques of data collection and its presentation.
- To emphasize the need for numerical summary measures for data analysis,

Course Code	Title	Credits
RJSUSTA101	DESCRIPTIVE STATISTICS-1	2 Credits (45 lectures)
<u>Unit I : Types of Data and Data Condensation</u>		15 Lectures
a) Concept of population and sample. Finite, Infinite population, Notion of SRS, SRSWOR and SRSWR. b) Collection of Primary data: concept of a questionnaire and a schedule, Secondary data. c) Types of data: Qualitative and quantitative data; Time series data and geographical data, discrete and continuous data. d) Different types of scales: nominal, ordinal, interval and ratio. Tabulation of data. e) Dichotomous classification- for two and three attributes, Verification for consistency. f) Association of attributes: Yule's coefficient of association (Q), Yule's coefficient of Colligation (Y).		
<u>Unit II : Classification and Presentation of data and Measures of central tendency</u>		15 Lectures
a) Univariate frequency distribution. Discrete and continuous variables. Cumulative frequency distribution. b) Bivariate frequency distribution, marginal and conditional frequency distribution. c) Diagrammatic representation: Bar diagrams and Pie chart.		

<p>d) Graphical representation of frequency distribution by Histogram, frequency polygon, Cumulative frequency curve. Stem and leaf diagram.</p> <p>e) Concept of central tendency of data. Requirements of good measure.</p> <p>f) Locational averages: Median, Mode, and Partition Values: Quartiles, Deciles, and Percentiles.</p> <p>g) Mathematical averages: Arithmetic mean (Simple, weighted mean, combined mean), Geometric mean, Harmonic mean and their relationship.</p> <p>h) Empirical relation between mean, median and mode.</p> <p>i) Merits and demerits of using different measures & their applicability.</p> <p>j) Box Plot.</p>	
<p><u>Unit III : Measures of Dispersion, Skewness & Kurtosis</u></p> <p>a) Concept of dispersion. Requirements of good measure.</p> <p>b) Absolute and Relative measures of dispersion: Range, Quartile Deviation, Mean absolute deviation, Standard deviation.</p> <p>c) Variance and Combined variance, raw moments and central moments and relations between them. Their properties.</p> <p>d) Concept of Skewness and Kurtosis: Measures of Skewness: Karl Pearson's, and Bowley's and Coefficient of Skewness based on moments. Measure of Kurtosis.</p>	<p>15 Lectures</p>

Learning Objective:

To give the basics as well as comprehensive background of probability theory and statistical methods to the beginners in simple and interesting manner.

Course Code	Title	Credits
RJSUSTA102	STATISTICAL METHODS-I	2 Credits (45 lectures)
<u>Unit I : Elementary Probability Theory</u>		15 Lectures
<ul style="list-style-type: none"> a) Trial, random experiment, sample point and sample space. b) Definition of an event. Operation of events, mutually exclusive and exhaustive events, equally likely and impossible events. c) Classical (Mathematical) and Empirical definitions of Probability and their properties. d) Theorems on Addition and Multiplication of probabilities. e) Independence of events, pairwise and mutual independence for three events, Conditional probability, Bayes theorem and its applications. 		
<u>Unit II : Concept of Discrete random variable and properties of its probability distribution</u>		15 Lectures
<ul style="list-style-type: none"> a) Concept of Random variable. Definition and properties of probability distribution and cumulative distribution. b) Function of discrete random variable. c) Raw and Central moments (definition only) and their relationship. (upto order four). d) Concepts of Skewness and Kurtosis and their uses. e) Expectation of a random variable. Theorems on Expectation & Variance. f) Joint probability mass function of two discrete random variables. Marginal and Conditional distributions. g) Covariance and Coefficient of Correlation. Independence of two random variables. 		
<u>Unit III : Some Standard Discrete Distributions</u>		15 Lectures
<ul style="list-style-type: none"> a) Discrete Uniform, Binomial and Poisson distributions and derivation of their mean and variance. b) Recurrence relation for probabilities of Binomial and Poisson distributions. Poisson approximation to Binomial distribution. c) Concept of hypergeometric distribution. 		

REFERENCES

- 1 Medhi J. : Statistical Methods, An Introductory Text, Second Edition,
New Age International Ltd.
- 2 Agarwal B.L. : Basic Statistics, New Age International Ltd.
- 3 Spiegel M.R. : Theory and Problems of Statistics, Schaum' s Publications series.
Tata McGraw-Hill.
- 4 Kothari C.R. : Research Methodology, Wiley Eastern Limited.
- 5 David S. : Elementary Probability, Cambridge University Press.
- 6 Hoel P.G. : Introduction to Mathematical Statistics, Asia Publishing House.
- 7 Hogg R.V. and Tannis E.P. : Probability and Statistical Inference.
McMillan Publishing Co. Inc.
- 8 Pitan Jim : Probability, Narosa Publishing House.
- 9 Goon A.M., Gupta M.K., Dasgupta B. : Fundamentals of Statistics, Volume II :
The World Press Private Limited, Calcutta.

DISTRIBUTION OF TOPICS FOR PRACTICALS

SEMESTER-I

Sr. No.	Course Code: RJSUSTAP101
1	Tabulation
2	Attributes
3	Classification of Data
4	Diagrammatic representation.
5	Measures of central tendency
6	Measures of dispersion

Sr. No.	Course Code: RJSUSTAP102
1	Probability
2	Discrete Random Variables
3	Bivariate Probability Distributions
4	Binomial distribution, Poisson distribution and Hyper geometric distribution

SEMESTER II

Learning Objective:

- To orient students about the technique of data analysis
- To introduce the techniques of data collection and its presentation
- To emphasize the need for numerical summary measures for data analysis

Course Code	Title	Credits
RJSUSTA201	DESCRIPTIVE STATISTICS-II	2 Credits (45 lectures)
<u>Unit I : Correlation and regression analysis</u>		15 Lectures
<p>a) Scatter Diagram, Product moment correlation coefficient and its properties. Spearman's Rank correlation. (With and without ties).</p> <p>b) Concept of linear regression. Principle of least squares. Fitting a straight line by method of least squares. Concept and use of coefficient of determination (R^2).</p> <p>c) Relation between regression coefficients and correlation coefficient.</p> <p>d) Fitting of curves: quadratic curves, power curves, exponential and logarithmic curves.</p>		
<u>Unit II : Time Series</u>		15 Lectures
<p>a) Definition of Time series. Its components. Models of Time Series. Estimation of trend by: (i) Freehand curve method (ii) Method of Semi averages (iii) Method of Moving Averages (iv) Method of Least Squares. (v) Exponential Smoothing method</p> <p>b) Estimation of seasonal component by: (i) Method of simple averages (ii) Ratio to moving average method (iii) Ratio to trend method.</p>		
<u>Unit III : Index Numbers</u>		15 Lectures
<p>a) Index numbers as comparative tool. Stages in the construction of Price Index Numbers.</p> <p>b) Measures of Simple and Composite Index Numbers. Laspeyre's, Paasche's, Marshal-Edgeworth's, Dorbisich & Bowley's and Fisher's Index Numbers formula.</p> <p>c) Quantity Index Numbers and Value Index Numbers Time reversal test, Factor reversal test, Circular test.</p>		

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d) Fixed base Index Numbers, Chain base Index Numbers. Base shifting, splicing and deflating. e) Cost of Living Index Number. Concept of Real Income based on Wholesale Price Index Number.	
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Learning Objective:

To give the basics as well as comprehensive background of probability theory and statistical methods to the beginners in simple and interesting manner.

Course Code	Title	Credits
RJSUSTA202	STATISTICAL METHODS-II	2 Credits (45 lectures)
<u>Unit I : Continuous Random Variable</u>		15 Lectures
<p>a) Concept of Continuous random variable, P.D.F and C.D.F and their properties and their graphical representation.</p> <p>b) Expectation of a random variable and its properties. Measures of location, dispersion, skewness and kurtosis. Raw and central moments (simple illustrations).</p>		
<u>Unit II : Some Standard Continuous Distributions</u>		15 Lectures
<p>a) Uniform distribution and derivation of its mean, median, mode and variance.</p> <p>b) Exponential distribution and derivation of its mean, median, mode and variance.</p> <p>c) Normal distribution and its properties. Normal approximation to Binomial and Poisson distribution (statement only). Use of Normal table.</p>		
<u>Unit III : Estimation and Testing of hypothesis</u>		15 Lectures
<p>a) Concept of a statistic, estimate and its sampling distribution. Parameter and it's estimator. Concept of bias and standard error of an estimator. Central Limit theorem (statement only) and its uses. Sampling distribution of sample mean and sample proportion (For large sample only). Standard errors of sample mean and sample proportion. Point and Interval estimate of single mean, single proportion from sample of large size.</p> <p>b) Concept of hypothesis, Null and Alternate hypothesis, Types of errors, Critical region, Level of significance.</p> <p>c) Large sample tests (using central limit theorem, if necessary), For testing specified value of population mean, For testing specified value in difference of two means, For testing specified value of population proportion, For testing specified value of difference of population proportions (Development of critical region is not expected).</p>		

REFERENCES

1. Medhi J. : Statistical Methods, An Introductory Text, Second Edition, New Age International Ltd.
2. Agarwal B.L. : Basic Statistics, New Age International Ltd.
3. Spiegel M.R. : Theory and Problems of Statistics, Schaum' s Publications series. Tata McGraw-Hill.
4. Kothari C.R. : Research Methodology, Wiley Eastern Limited.
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7. Hogg R.V. and Tannis E.P. : Probability and Statistical Inference. McMillan Publishing Co. Inc.
8. Pitan Jim : Probability, Narosa Publishing House.
9. Goon A.M., Gupta M.K., Dasgupta B. : Fundamentals of Statistics, Volume II : The World Press Private Limited, Calcutta.

DISTRIBUTION OF TOPICS FOR PRACTICALS

SEMESTER-II

Sr. No.	Course Code: RJSUSTAP201
1	Correlation analysis
2	Regression analysis
3	Fitting of curve
4	Time Series
5	Index number

Sr. No.	Course Code: RJSUSTAP202
1	Continuous Random Variables
2	Uniform, Exponential and Normal Distributions
3	Applications of central limit theorem and normal approximation
4	Testing of Hypothesis
5	Large Sample Tests

Semester End Examination

Theory: At the end of the semester, examination of two (2) hours duration and sixty (60) marks based on the three units shall be held for each course.

Pattern of **Theory question** paper at the end of the semester for **each course** will be as follows:

Total number of questions is three, each of twenty marks.

Question one, two & three are based on unit I, unit II and unit III respectively.

Practicals : At the end of the semester, examination of two hours duration and 45 marks shall be held for **each course**. Five marks for journal (45+05=50).

Students will attempt five questions out of seven questions, each of nine marks. Each question may contain sub questions.

Internal Examination

The paper pattern of the question paper of IA1 and IA2 will be as follows:

Question one: 5 questions of one mark each, Question two: (a) 1 questions of two marks, (b) 1 questions of three marks, Question three: Attempt any two out of three questions, each of five marks.

Workload

Theory : 3 lectures per week per course.

Practicals: 3 lecture periods per course per week per batch. All three lecture periods of the practicals shall be conducted in succession together on a single day