

Resolution No.: AC/I(19-20).2.RUA14

S.P. Mandali's
RAMNARAIN RUIA AUTONOMOUS COLLEGE



Syllabus for: F.Y.B.A.

Program: B.A.

Course Code: Statistics (RUASTA)

(Choice Based Credit System (CBCS) with effect from academic year 2018-19)

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

Preamble

B. A. Statistics program is of 120 credits spread over six semesters. This program is offered at the Department of Statistics, Ramnarain Ruia Autonomous College, Matunga, Mumbai.

The program develops a wide range of skills beyond knowledge of statistical topics, including mathematical, computational and non-mathematical skills.

The program emphasizes on theory and applications of statistics. It is well structured to provide the knowledge and skills in depth necessary for the employability of students in industry, other organizations, as well as in academics.

Ramnarain Ruia Autonomous College has the academic autonomy. The independent projects and presentation work is one of the important components of this program. The syllabus offers two courses in the first year (two semesters) and it covers most of the basic core concepts. The second year syllabus has four courses. The syllabus has been framed to have a good balance of theory, methods and applications of statistics. The third year offers two courses of core statistics and one courses of applied statistics in each semester. Practical courses in all three years are designed to enhance the ability of students to study the applications of the core courses and to develop the interpretation skills. The presentations on various topics develop students' public speaking and communication skills.

Objective of Course

In the first year, there will be two courses in Statistics per semester. The following are the objectives of these courses:

1. To understand various data types and to learn visualization techniques.
2. To enable learners to summarize data quantitative and graphical methods.
3. To enable learners with concepts of probability and probability distributions
4. To equip learners with requisite quantitative techniques.
5. To develop learner's presentation and communication skills.

Learning Outcomes

1. Learners will be able to visualize data using elementary graphs and diagrams and will be able to apply appropriate measures for quantitative and qualitative data.
2. Learners will be able to choose and apply an appropriate statistical analysis or modeling methods to solve problems arising in different fields.
3. Learners will be able to use statistical tools to solve problems from different fields.
4. Learners will be able to engage in interpretation of wide range of information from variety of disciplines including quantitative analysis.

SEMESTER I

Title of Course	DESCRIPTIVE STATISTICS I			
Course Code	UNIT	TOPICS	Credits	L / Week
RUASTA101	I	Types of Data and Data Condensation	2	1
	II	Measures of central tendency		1
	III	Measures of Dispersion, Skewness & Kurtosis		1
RUASTAP101	Practical based on courses above		1	3

SEMESTER II

Title of Course	DESCRIPTIVE STATISTICS II			
Course Code	UNIT	TOPICS	Credits	L / Week
RUASTA201	I	Correlation and Regression Analysis	2	1
	II	Time Series		1
	III	Index Numbers		1
RUASTAP201	Practical based on courses above		1	3

COURSE RUASTA101: DESCRIPTIVE STATISTICS I

<p>Unit I - Types of Data and Data Condensation:</p> <ul style="list-style-type: none"> • Global Success stories of Statistics/Analytics in various fields. • Concept of Population and Sample. Finite, Infinite Population, Notion of SRS, SRSWOR and SRSWR • Different types of scales: Nominal, Ordinal, Interval and Ratio. • Methods of Data Collection: i) Primary data: concept of a Questionnaire and a Schedule, ii) Secondary Data • Types of data: Qualitative and Quantitative Data; Time Series Data and Cross Section Data, Discrete and Continuous Data • Tabulation • Dichotomous classification- for two and three attributes, Verification for consistency • Association of attributes: Yule's coefficient of association Q. Yule's coefficient of Colligation Y, Relation between Q and Y (with proof). • Univariate frequency distribution of discrete and continuous variables. Cumulative frequency distribution • Data Visualization: Graphs and Diagrams: Histogram, Polygon/curve, Ogives. Heat Map, Tree map. • Bivariate Frequency Distribution of discrete and continuous variables 	<p>15 Lectures</p>
<p>Unit II–Measures of central tendency</p> <ul style="list-style-type: none"> • Concept of central tendency of data, Requirements of good measures of central tendency. • Location parameters : Median, Quartiles, Deciles, and Percentiles • Mathematical averages Arithmetic mean (Simple, weighted mean, combined mean), Geometric mean, Harmonic mean, Mode, Trimmed mean. • Empirical relation between mean, median and mode • Merits and demerits of using different measures & their applicability. 	<p>15 Lectures</p>
<p>Unit III - Measures of Dispersion, Skewness & Kurtosis</p> <ul style="list-style-type: none"> • Concept of dispersion, Requirements of good measure • Absolute and Relative measures of dispersion: Range, Quartile Deviation, Inter Quartile Range, Mean absolute deviation, Standard deviation. • Variance and Combined variance, raw moments and central moments and relations between them. Their properties • Concept of Skewness and Kurtosis: Measures of Skewness: Karl Pearson's, Bowley's and Coefficient of skewness based on moments. Measure of Kurtosis. Absolute and relative measures of skewness. • Box Plot: Outliers 	<p>15 Lectures</p>

COURSE RUASTA201: DESCRIPTIVE STATISTICS II

<p>UNIT – I: Correlation, Simple linear Regression Analysis and Fitting of curves</p> <ul style="list-style-type: none"> • Visualizing relationship using Bubble chart, Scatter Diagram, • Karl Pearson’s Product moment correlation coefficient and its properties. • Spearman’s Rank correlation.(With and without ties) • Concept of Simple linear regression. Principle of least squares. Fitting a straight line by method of least squares (Linear in Parameters) • Relationship between regression coefficients and correlation coefficient, cause and effect relationship, Spurious correlation. • Concept and use of coefficient of determination (R^2). • Measures of association with the help of Tau A, Tau B, Tau C, Gamma and Lambda, Somer’s d • Fitting of curves reducible to linear form by transformation. 	<p>15 Lectures</p>
<p>UNIT – II : Time Series</p> <ul style="list-style-type: none"> • Definition of time series. Components of time series. Models of time series. • Estimation of trend by: (i) Freehand Curve Method (ii) Method of Semi Average (iii)Method of Moving Average (iv) Method of Least Squares (Linear Trend only) • Estimation of seasonal component by i) Method of Simple Average ii) Ratio to Moving Average iii)Ratio to Trend Method • Simple exponential smoothing • Stationary Time series 	<p>15 Lectures</p>
<p>Unit - III : Index Numbers</p> <ul style="list-style-type: none"> • Index numbers as comparative tool. Stages in the construction of Price Index Numbers. • Measures of Simple and Composite Index Numbers. Laspeyre’s, Paasche’s, Marshal-Edgeworth’s, Dobisch & Bowley’s and Fisher’s Index Numbers formula • Quantity Index Numbers and Value Index Numbers Time reversal test, Factor reversal test, Circular test • Fixed base Index Numbers, Chain base Index Numbers. Base shifting, splicing and deflating • Cost of Living Index Number. Concept of Real Income. 	<p>15 Lectures</p>

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- 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 PitanJim:“Probability”, Narosa Publishing House.
- 9 Goon A.M., Gupta M.K., Dasgupta B.:“Fundamentals of Statistics”, Volume II: The World Press Private Limited, Calcutta.
10. Gupta S.C., Kapoor V.K.: “Fundamentals of Mathematical Statistics”, Sultan Chand & Sons
11. Gupta S.C., Kapoor V.K.: “Fundamentals of Applied Statistics”, Sultan Chand & Sons

Distribution of topics for Practicals in Semester I

Course Code RUSSTAP101(A)	
Sr. No.	Practicals based on course
1	Tabulation
2	Classification of Data
3	Attributes
4	Diagrammatic representation
5	Measures of central tendency
6	Measures of dispersion
7	Practical using Excel and R i) Classification of Data and Diagrammatic representation ii) Measures of central tendency iii) Measures of dispersion

Distribution of topics for Practicals in Semester II

Course Code RUSSTAP201(A)	
Sr. No.	Practicals based on course
1	Correlation analysis
2	Regression analysis
3	Fitting of curve
4	Time series
5	Index number-I
6	Index number-II
7	Practical using Excel and R i) Correlation analysis ii) Regression analysis iii) Fitting of curve

THEORY

Internal Assessment of Theory Core Courses Per Semester Per Course

1. One Class Test/ Project / Assignment / Presentation.....20 Marks.
2. One Class Test / Project / Assignment / Presentation..... 20 Marks.

Semester End Examination

Theory: At the end of the semester, examination of two hours duration and 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:**

There shall be THREE COMPULSORY Questions of 20 marks each (Internal Option).

Question1 based on Unit I, Question 2 based on Unit II, Question 3 based on Unit III.

PRACTICAL

Internal Assessment of Practical Core Courses per Semester per course

1. One Class Test15 Marks.
2. Journal05 Marks.

Practical Core Courses per Semester per course

1. Practical Examination30 Marks.

At the end of the semester, examination of one and half hours duration and 30 marks shall be held for **each course**.

Pattern of **Practical question** paper at the end of the semester for **each theory course:**

There shall be **Three** COMPULSORY Questions with internal choice.

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.
