



ST. XAVIER'S COLLEGE – MUMBAI
(Est. 1869)

(An Autonomous College affiliated with the University of Mumbai)

**Syllabus for Four-Year Undergraduate
Programme as per National Education Policy
(NEP-2020)**

**Programme:
BSc in STATISTICS**

The academic year 2023–2024

Shinde

PRINCIPAL
ST. XAVIER'S COLLEGE
(AUTONOMOUS)
MUMBAI - 400 001.



APPROVED SYLLABUS

Syllabus

First Semester Courses in Statistics

2023-2024

Contents:

- Syllabus for Core Courses:
 - USSTA4501CR1 : Fundamentals of Statistics (A)
 - USSTA4501CR1PR : Fundamentals of Statistics (A)(Practical)

- Syllabus for Vocational Skill Courses:
 - USSTA4501VS1 : Data Collection & Visualization

- Syllabus for Open Elective (OE):
 - USSTA4501OE1 : Descriptive Statistics(A)

- Evaluation and Assessment guidelines



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First Year BSc in Statistics		
Course Title: Fundamentals of Statistics (A)		Course Code:USSTA4501CR1
Credits: Theory (3) = 45 hr		
No.	Course Objectives	
	This course aims to	
1	introduce various types of data.	
2	introduce techniques of organization of data.	
3	emphasize the need for summary measures for data analysis.	
4	orient students to simple techniques of data analysis.	
CO	Course Outcomes On completing the course, the learner will be able to	Bloom's Taxonomy Level (BT level)
1	i) identify and define different types of data and measurement scales. ii) define various terms used in obtaining summary statistics, correlation and regression.	Knowledge
2	explain the procedure/concept involved in summary statistics, correlation and regression.	Understanding
3	solve numericals based on the above topics.	Analysis



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Unit 1 : TYPES OF DATA & MEASURES OF CENTRAL TENDENCY.

(15 L)

Qualitative and Quantitative data; Geographical, Time series data; Discrete and Continuous data, Panel and Cross section data.

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

Illustrations of Likert scale.

Concepts of statistical population and sample.

Primary & Secondary data.

Secondary data – its major sources including some government publications.

Tabulation and Classification of data. Requisites of a good table.

Univariate frequency distribution of discrete and continuous variables. Cumulative frequency distribution. (Raw data, ungrouped frequency distribution, grouped frequency distribution.)

Bivariate frequency distribution, Marginal and Conditional frequency distributions.

Arithmetic mean (A.M.) and its properties (simple and weighted), Combined mean. Geometric mean (G.M.) and Harmonic mean (H.M.).

Quantiles (Median, Quartiles, Deciles, Percentiles), Mode (Grouping Method not expected).

Empirical relationship between A.M., median and mode. Merits, Demerits and Uses of A.M., Median, Mode, G.M. and H.M.

Requisites of a good average.

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

Unit 2 : MEASURES OF DISPERSION.

(15 L)

Absolute measure: Range, Interquartile range, Quartile deviation, Mean Absolute deviation, Standard deviation (Variance) and their relative measures. Combined variance. Raw and Central moments up to the fourth order and the relationship between them (with proof). Measures of Skewness and Kurtosis.



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Unit 3 : MEASURES OF ASSOCIATION, CORRELATION & REGRESSION.

(15 L)

Categorical data analysis for Association in a table using Yule’s coefficient of Association.
 Scatter diagram. Product moment correlation coefficient and its properties.
 Rank correlation Spearman’s measure. Concept of Spurious correlation & causation.
 Concept of Simple linear regression. Principle of least square.
 Fitting of a straight line by the method of least square.
 Relation between regression coefficient and correlation coefficient. Coefficient of determination.
 Fitting of curves reducible to linear form by transformation. Fitting of the quadratic curve using least squares.

List of Recommended Reference Books:

1. Goon A.M., Gupta M.K., Dasgupta B. Fundamentals of Statistics, Volume I, The World Press Private Limited, Calcutta. Fifth edition.
2. Shah R.J.: Descriptive Statistics, Seth Publications. Eighth edition.
3. Spiegel, M.R.: Theory and Problems of Statistics, Schaum’s Publishing Series. Tata McGraw-Hill. First edition.
4. Welling, Khandeparkar, Pawar, Naralkar: Descriptive Statistics: Manan Prakashan
5. S.P. Gupta: Statistical Methods, Sultan Chand & Sons. First edition.
6. Richard. I. Levin, David. S. Rubin: Statistics for Management. Fifth edition
7. <https://corporatefinanceinstitute.com/resources/data-science/descriptive-statistics/>

Evaluation (Theory, USSTA4501CR1): Total marks per course - 100.

- I. Formative Assessment for Learning
 (continuous internal assessment - CIA to improve learning).
 CIA: 40 marks
 CIA 1: Written test: 20 marks
 CIA 2: Written test/Assignment: 20 marks
- II. Summative Assessment of Learning
 (focus on outcomes, quantitative data for outcomes of instruction).
 End Semester Examination : 60 marks
 One question from each unit for 20 marks, with internal choice.
 Total marks per question with choice : 25 to 27.

Distribution of Bloom’s Taxonomy levels for the course assessment:

Learning Levels	Knowledge	Understanding	Analysis
% Weightage	10-20%	60-80%	10-20%



First Year BSc in Statistics		
Course Title: Fundamentals of Statistics (A)(Practical)		
Course Code:USSTA4501CR1PR		
Credits: Practical (1) = 30 hr		
No.	Course Objectives	
	This course aims to	
1	classify and tabulate data.	
2	obtain summary statistics	
3	measure association, correlation & obtain regression equations.	
CO	Course Outcomes	Bloom's Taxonomy Level (BT level)
	On completing the course, the learner will be able to	
1	solve numerical problems based on summary statistics, correlation and regression.	Analysis

List of Practicals:

1. Classification & Tabulation of data (Quantitative and Categorical)
2. Measures of Central tendency.
3. Measures of Dispersion.
4. Theory of Association, Correlation & Regression.
5. Curve fitting.

Evaluation (Practical, USSTA4501CR1PR)

Total marks practical course - 50

CIA (Written test /Project): 15 marks,

Journal: 5 marks,

End Semester Examination: 30 marks.

Distribution of Bloom's Taxonomy levels for the practical assessment:

Learning Levels	Analysis
Percentage	100%



First Year BSc in Statistics		
Course Title: Data Collection and Visualization using Excel		
Course Code:USSTA4501VS1		
Theory (1 Credit = 15 hrs) & Practical (1 Credit = 30 hrs)		
No.	Course Objectives The course aims to	
1	introduce techniques of data collection & presentation.	
2	equip students with basic skills in Excel to present data.	
CO	Course Outcomes On completing the course, the learner will be able to	Bloom's Taxonomy Level (BT level)
1	know the various methods of data collection & visualization.	Knowledge
2	draw graphs & diagrams and process data.	Analysis
3	create an Excel dashboard.	Create

Unit 1 : QUESTIONNAIRE & PRESENTATION OF DATA, DATA PRE-PROCESSING & VISUALIZATION USING EXCEL : (15 L)

Designing a questionnaire/schedule, and distinguishing between them. Likert scale for data collection.

Concept of validation of the questionnaire.

Problems faced when collecting data through the questionnaire.

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

Diagrams: Bar diagrams and Pie charts.

Stem and Leaf diagram, Dot plot.

Box-Whisker Plot.

Excel Basics: Data entry, formatting, editing, use of functions.

Design of data collection formats, data quality issues, cleaning & treatment of missing data,

Principles of data visualization & different methods of presenting data.

Pivot table functionality.

Creating an Excel dashboard.



List of Recommended Reference Books:

1. Kothari, C.R.: Research Methodology, Methods and Techniques, Wiley Eastern Limited. First Edition.
2. Shah R.J.:Descriptive Statistics, Seth Publications. Eighth edition.
3. <https://www.pdfdrive.com/excel-2019-bible-d184084426.html>
4. <https://trumpexcel.com/learn-excel/>

Evaluation (USSTA4501VS1): Total marks per course - 50.

- I. Formative Assessment for Learning
(continuous internal assessment - CIA to improve learning).
CIA: 20 marks
- II. Summative Assessment of Learning
(focus on outcomes, quantitative data for outcomes of instruction).
End Semester Examination: 30 marks

Distribution of Bloom's Taxonomy levels for the course assessment:

Learning Levels	Knowledge	Analysis	Create
% Weightage	30-40%	30-40%	20-40%



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First Year BSc in Statistics		
Course Title: Descriptive Statistics (A)		Course Code: USSTA4501OE1
Credits: Theory (2) = 30 hr (for Arts who have not taken Statistics.)		
No.	Course Objectives The course aims to	
1	orient students to understand and present data.	
2	familiarize students with data summarizing techniques.	
CO	Course Outcomes On completing the course, the learner will be able to	Bloom's Taxonomy Level (BT level)
1	identify and define different types of data and measurement scales, define various terms used in summary statistics.	Knowledge
2	explain the procedure/concept involved in summary statistics.	Understanding
3	solve numericals based on the above topics.	Analysis

Unit 1 : Data Types and Presentation

(15 L)

- a) Types of data (Quantitative, Qualitative, Geographical, Time series data, Discrete and Continuous, Prospective and Retrospective data, Longitudinal and Cross-sectional data.
- b) Measurement scales: Nominal, Ordinal, Ratio and Interval.
- c) Frequency distribution of discrete and continuous variables. Cumulative frequency distribution.
- d) 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.



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Unit 2: Measures of Central Tendency or Location

(15 L)

- a) Arithmetic mean and its properties (simple and weighted), Combined mean.
- b) Quantiles (Median, Quartiles, Deciles, Percentiles), Mode. Empirical relationship between mean, median and mode.
- c) Merits, Demerits and Uses of Arithmetic mean, Median, Mode.
- d) Requisites of a good average.
- e) Choice of scale of measurement for each measure of central tendency.

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. Shah R.J, Descriptive Statistics, Seth Publications, Eighth Edition.
- 3. Welling, Khandeparkar, Pawar, Naralkar, Descriptive Statistics, Manan Publication.
- 4. <https://youtu.be/7kPqESo1vRw>
- 5. <https://www.youtube.com/c/BrandonFoltz/search?query=statistics%2010>
- 6. Gholba, Phatak, Jardosh: Descriptive Statistics -I Vipul Prakashan

Evaluation (Theory, USSTA4501OE1): Total marks per course - 50.

- I. Formative Assessment for Learning
(continuous internal assessment - CIA to improve learning).
CIA: 20 marks
- II. Summative Assessment of Learning
(focus on outcomes, quantitative data for outcomes of instruction).
End Semester Examination: 30 marks

Distribution of Bloom’s Taxonomy levels for the course assessment:

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