

St. Xavier's College (Autonomous), Ahmedabad
Syllabus of Semester – I of the following departments under Faculty of Science
based on Under Graduate Curriculum Framework – 2023 (NEP)
to be implemented from the Academic Year 2023-24.

FACULTY OF SCIENCE

DEPARTMENT OF STATISTICS

Course	Title	Content	Hours/Week	Credit
STMC111C	Basic Statistics for Data Science	U-1: Data types and classification U-2: Data visualization U-3: Measures of central tendency U-4: Measures of dispersion and Moments	4 hrs	4
STMC112L	Statistics Practical-I	Practical using manual calculation and R and Experiential learning	8 hrs	4
STSE111C	Basic spreadsheet tools	U-1: Basic Excel and functions U-2: Reports, Formatting, and Basic Data Analysis	4 hrs	2

BSc. Statistics

STMC111C Basic Statistics for Data Science

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credit Distribution of The Course (Total - 04 Credit)			Eligibility Criteria	Prerequisite(s) of the Course (if any)
	Lecture	Practical	Experiential Lab		
Basic Statistics for Data Science & STMC111C	4	0	0	10 + 2 from a recognized board in any stream	Basic Mathematics, Observation & Analytical Skills

Course Outcomes:

- CO-1 Acquire knowledge of introductory statistics, its scope and importance in various areas such as Medical, Engineering, Agricultural and Social Sciences etc.
- CO-2 Learn various types of data, their organization, visualization and descriptive statistics such as presentations in tabular form graphs and summary measures such as measures of central tendency and dispersion etc.
- CO-3 Compute suitable measures of averages.
- CO-4 Compute suitable measures of averages, dispersion, and higher order moments from sample/population data.

Learning Outcomes: After completion of this course, the students will be able to

- (1) Scrutinize an arbitrary data set.
- (2) Represent the data in tabular and diagrammatic form.
- (3) Prepare the frequency distribution for qualitative and quantitative data.
- (4) Find the summary measures, viz. the measures of central tendency, measure of dispersion, measures of skewness and kurtosis of a univariate data.

Unit: 1 - Data Types and Classification (20Hrs)

- Types of data: Primary, Secondary, Internal and External data and their sources. Designing a questionnaire schedule.
- Classification of data: Qualitative, Quantitative: Discrete, Continuous; Chronological (Time series) data.
- Nominal, Ordinal, Interval and Ratio data.
- Frequency: grouped and ungrouped data; Construction of frequency and cumulative frequency distribution.
- Presentation of qualitative data: Tabulation (up to four attributes).

Unit: 2 - Data visualization (15Hrs)

- Graphical representation of grouped data: Histogram, frequency curve, frequency polygon, ogives (cumulative frequency curves)
- Diagrammatic representation of data: Bar diagrams- simple Bar, multiple bar, sub-divided bar and percentage bar diagrams.
- Two dimensional diagrams: Rectangles and Pie diagrams. Stem - Leaf plot.
- Bivariate: Frequency distribution, Marginal and Conditional frequency distributions.

Unit: 3 - Measures of Central Tendency (12Hrs)

- Concept of central tendency, various measures of central tendency and their inter-relationship. Their merits and demerits.
- Empirical relation between mean, median and mode. Properties and applications of measures of central tendency.
- Partition values (quartiles, deciles and percentiles)

Unit: 4 - Measures of Dispersion and Moments (13Hrs)

- Concept of variation/dispersion, quartile deviation, Absolute and relative measures of dispersion with their merits, demerits and applications.
- Moments: raw moments, central moments, factorial moments and their inter-relationship.
- Skewness, Kurtosis and their measures. Box plot.

References:

1. Agresti, A. (2010): Analysis of Ordinal Categorical Data, 2nd Edition, Wiley.
2. Anderson T.W. and Jeremy D. Finn (1996). “The New Statistical Analysis of Data”, Springer.
3. Freedman, D., Pisani. R and Purves. R. (2014), “Statistics”, 4th Edition, W. W. Norton & Company.
4. Gupta, S.C. (2018), “Fundamental of Statistics”, Himalaya Publishing House, 7th Edition.
5. Gupta S.C. and V.K. Kapoor (2020), “Fundamental of Mathematical Statistics”, Sultan Chand and Co. 12th Edition.
6. Goon A.M., Gupta M.K. and Dasgupta B. (2002): “Fundamentals of Statistics”, Vol. I & II, 8th Edn. The World Press, Kolkata.
7. John E. Freund’s “Mathematical Statistics with Applications”, (7th Edn.), Pearson Education, Asia.
8. Mood, A.M. Graybill, F.A. and Boes, D.C. (2007): “Introduction to the Theory of Statistics”, 3rd Edn., (Reprint), Tata McGraw-Hill Pub. Co. Ltd.

Suggested Online Links/Readings:

- <http://heecontent.upsdc.gov.in/SearchContent.aspx>
- <https://swayam.gov.in/explorer?searchText=statistics>
- <https://nptel.ac.in/course.html>
- <https://www.edx.org/search?q=statistics>
- <https://www.coursera.org/search?query=statistics&>

Pedagogy:

1. The course is taught using traditional chalk and talk method using problem solving through examples and exercises.
2. Students are encouraged to use resources available on open sources.

STMC112L Statistics Practical-I

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credit Distribution of The Course (Total - 04 Credit)			Prerequisite(s) of the Course (if any)
	Lecture	Practical	Experiential lab	
Statistics Practical-I & STMC112L	0	2	2	Basic Mathematics, Observation & Analytical Skills

Course Outcomes:

- CO-1 Ability to represent/summarise the data/information using appropriate Graphical methods including common graphical tools (such as boxplots, histograms, and stem plots) and also to draw inferences from these graphs
- CO-2 Acquire the knowledge to identify the situation to apply appropriate measure of central tendency as per the nature and need of the data and draw meaningful conclusions regarding behavior of the data.
- CO-3 Ability to measure skewness and kurtosis of data and define their significance.

Learning Outcomes: After completion of this course, the students will be able to

- (1) To represent statistical data diagrammatically and graphically.
- (2) To compute various measures of central tendency, dispersion, moments, skewness and kurtosis.
- (3) To interpret summary Statistics of computer output.

Computing all the practical manually and using R

- 1. Classification of the variable/data in to various category and tabulation
- 2. Presentation of data by frequency tables, diagrams and graphs, stem and leaf, partition values.
- 3. Data visualization: Histogram, Frequency curve, frequency polygon, ogives (cumulative frequency curves), Bar Diagrams, Pie Diagram, Stem - Leaf and box plot.
- 4. Problems based on Arithmetic Mean (AM), geometric mean, harmonic mean, weighted AM, trimmed mean, corrected mean.
- 5. Problems based on Mode, median, partition values.
- 6. Absolute and relative measures of dispersion, Box plots.
- 7. Problems on moments, skewness and kurtosis.

Activities: (To be conducted in a group of two students)

- (1) Preparation of questionnaire
- (2) Classification of data activity/game
- (3) Graphical presentation of data collected and interpretation
- (4) Numerical descriptive report preparation based on data
- (5) Case studies

STSE111C - Basic Spreadsheet tools

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credit Distribution of The Course (Total - 02 Credit)			Prerequisite(s) of the Course (if any)
	Lecture	Practical	Experiential lab	
Basic Spreadsheet tools & STSE111C	0	4	0	Basic Mathematics, Observation & Analytical Skills

Course Outcomes:

- CO-1 Compute the skill of making charts and Pivot tables.
- CO-2 Compute the skill working with different functions.
- CO-3 By studying this course, students will be able to make reports and formatting using spreadsheets and use interpretation to make decisions.

Learning Outcomes: After completion of this course, the students will be able to

- (1) To apply function in Excel tables, formation of Pivot tables and Pivot chart
- (2) By filtering, reordering, summarizing data to generate reports

Unit-1 Basic Excel and functions

(30Hrs)

- Overview of Excel
- Shortcut keys for various functions in Excel
- Working with data and Excel tables
- Basic function, logical functions, and power functions
- Conditional expressions
- Performing calculations on data

Unit: 2 Reports, Formatting, and Basic Data Analysis**(30Hrs)**

- Changing workbook appearance
- Focusing on specific data by using filters
- Reordering and summarizing data
- Combining data from multiple sources
- Using PivotTables and Pivot Charts
- Printing worksheets and Charts

References:

1. Graduate Statistics in Excel by Mark Harmon (2011).
2. Statistical Analysis with Excel by Excel for professionals (2002).
3. Step by step Microsoft Excel 2013 by Curtis D. Frye.

Pedagogy:

1. The course is taught using computer to solving problem through examples and exercises.
2. Students are encouraged to use resources available on open sources.