# St. Xavier's College (Autonomous), Ahmedabad

**Syllabus of Semester – II of the following departments under Faculty of Data Science based on Undergraduate Curriculum Framework to be implemented from the Academic Year 2025-26.**

## DEPARTMENT OF DATA SCIENCE

**Category: II**

**BSc. Artificial Intelligence and Machine Learning (Hons.)**

## Multi-Disciplinary Course: Foundations of Data Analysis

### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

| Course Title & Code | Credit Distribution of The Course | | | Eligibility Criteria | Prerequisite(s) of the Course (if any) |
|---|---|---|---|---|---|
| | Lecture | Tutorial | Practical / Practice | | |
| Calculus-1 | 3 | 0 | 2 | 10 + 2 from a recognized board in any stream | Basic Mathematics |

### Course Outcomes (COs)

After successful completion of the course, students will be able to

1. CO-1: To introduce fundamental concepts of data collection, organization, and analysis
- CO-2: To provide skills for summarizing, and interpreting real-world data.
- CO-3: To develop foundational understanding of correlation, variability, and ethical data use.
- CO-4: To prepare students for advanced study in data science and analytics and Machine Learning.

### Learning Outcomes (LOs)

At the end of the course, learners will be able to:

1. Understand fundamental concepts of data, datasets, variables, and data sources across different application domains.
2. Collect, clean, organize, summarize, and manage data using spreadsheet and analytical tools.
3. Apply descriptive statistical techniques to analyze and interpret data effectively.
4. Perform basic correlation and regression analysis for studying relationships between variables.
5. Use spreadsheet software such as Excel for data analysis, calculations, pivot tables, filtering, and reporting. Interpret analytical results and communicate insights through data storytelling and case studies.
6. Recognize ethical issues, data privacy concerns, data security challenges, and biases in data analytics.
7. Appreciate the role of programming and analytical thinking in modern data-driven decision making.

| UNIT | Topics / Subtopics | Hours |
|---|---|---|
| 1 | **Understanding Data:** Data, information, and knowledge; Data types; Data sources; datasets and variables; examples from business and various domains like health, and education etc, Data collection and cleaning, Tools for Data Analysis, Reliability and validity, Organizing Data with Sorting and Filtering in Excel, Conditional Formatting, Combining Datasets, Data Calculations, Formulas and Functions, Pivot Tables. | **15** |
| 2 | **Organizing and Summarizing Data:** Frequency tables, cumulative frequency tables, ogives, Measures of central tendency, dispersion and shape. | **15** |
| 3 | **Exploring Relationships in Data:** Bivariate data, Tools for bivariate data analysis, scatter plots, Correlation, Curve fitting, Linear trends and data patterns, simple linear regression, Lines of regression, regression coefficients, Properties of regression coefficients (without proof), Coefficient of determination. | **15** |
| 4 | **Making Sense of Data:** Data interpretation and storytelling; case studies, data ethics and privacy, Ethical Issues with Data, Data Ethics Scenarios, Data Security and data privacy, Bias in Data analysis, Types of Biases, Avoiding Bias, Data Analytics and the Importance of Programming in Analytics. | **15** |

Textbooks:


1. S.C.Gupta, Fundamentals of Statistics, Himalaya Publishing House, 2018.
2. Maheshwari, A. Data Analytics Made Accessible. Cengage Learning, 2015.


Reference Books:


1. Carlberg, C. Data Analysis Using Microsoft Excel. Pearson Education, 2014.
2. Provost, F., and Fawcett, T. Data Science for Business. O'Reilly Media, 2013.
3. Winston, W. L. Microsoft Excel Data Analysis and Business Modeling. Microsoft Press, 2019.
4. Davis, G., and Pecar, B. Business Statistics Using Excel. Oxford University Press, 2012.