

Branch Name:	Bachelor of Technology (Computer Engineering / Information Technology)
Program Code:	ET103/ET105
Course Title:	Open Elective – II: Data Handling and Visualization
Course Code:	2ET1030781T
Pre-requisite Course:	Basics of Programming, database concepts, and statistics

Course Objectives: This course aims to provide students with fundamental knowledge of data collection, preprocessing, analysis, and visualization techniques. Students will learn how to handle datasets efficiently and present insights through effective visual representations for decision-making.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								Total (Marks)
					Theory (Marks)				Practical (Marks)				
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Course Contents:

Unit No	Topics	Total Hours	Weightage (%)
1	Introduction to Data Handling: Introduction to Data Science, Types of Data (Structured, Semi-Structured, Unstructured), Data Sources, Data Collection Methods, Data Acquisition, Data Storage Concepts, Data Quality Issues, Data Lifecycle	6	15%
2	Data Preprocessing and Cleaning: Data Cleaning Techniques, Handling Missing Values, Noise Reduction, Outlier Detection and Treatment, Data Transformation, Data Normalization, Data Aggregation, Data Integration, Data Reduction Techniques, Feature Selection Basics	8	25%
3	Exploratory Data Analysis (EDA): Introduction to EDA, Descriptive Statistics, Measures of Central Tendency and Dispersion, Correlation Analysis, Data Summarization, Frequency Distribution, Pattern Identification, Data Interpretation, Hypothesis Generation	6	15%
4	Data Visualization Techniques: Principles of Data Visualization, Visual Perception, Chart Selection Techniques, Bar Charts, Line Charts, Pie Charts, Histograms, Scatter Plots, Box Plots, Heat Maps, Geographical Visualization, Interactive Visualization Concepts, Data Storytelling	8	25%
5	Visualization Tools and Applications: Introduction to Visualization Tools (Python Matplotlib, Seaborn, Plotly, Tableau, Power BI), Dashboard Design Principles, KPI Visualization, Report Generation, Real-Time Data Visualization, Business Intelligence Concepts, Case Studies and Industry Applications	8	20%

Reference Books:

1. Data Visualization: A Practical Introduction by Kieran Healy, Princeton University Press
2. Storytelling with Data by Cole Nussbaumer Knafllic, Wiley
3. Python for Data Analysis by Wes McKinney, O'Reilly Media
4. Fundamentals of Data Visualization by Claus O. Wilke, O'Reilly Media

List of Open-Source Software/learning website:

1. NPTEL Data Analytics Courses <https://nptel.ac.in/courses/106107220>
2. Kaggle Learn <https://www.kaggle.com/learn>
3. DataCamp Free Courses <https://www.datacamp.com/>
4. Google Looker Studio Documentation <https://datastudio.google.com/u/0/navigation/reporting>
5. Tableau Public Learning Resources <https://public.tableau.com/app/learn/how-to-videos>

Course Outcomes (CO):

Course Outcomes	Description	Bloom's Taxonomy Level
CO1	Explain data types, sources, and collection methods.	Understand (2)
CO2	Apply data cleaning and preprocessing techniques to datasets.	Apply (3)
CO3	Analyse datasets using exploratory data analysis methods.	Analyse (4)
CO4	Create meaningful visualizations and dashboards for data interpretation.	Create (6)
CO5	Evaluate visualization techniques and communicate insights effectively.	Evaluate (5)

Mapping of CO with PO and PSO:

Course Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	M	L	-	-	-	-	-	-	-	L	-	M	L	-	-	-
CO2	L	H	M	-	-	-	-	-	-	-	-	M	M	L	L	-
CO3	L	M	H	L	-	-	-	-	-	L	M	M	L	M	L	L
CO4	L	H	L	L	-	-	-	-	-	-	H	M	-	L	M	L
CO5	L	M	-	-	-	M	-	M	-	-	-	L	-	-	L	L

H: High, M: Medium, L: Low