COURSE NAME:	Advanced Data Analytics & Visualization
TOTAL DURATION:	45 Hrs
MODE OF DELIVERY	PHYSICAL CLASSROOM TRAINING AT RESPECTIVE COLLEGES
TRAINER TO STUDENT RATIO:	1:50
TOTAL MARKS:	75

Table 1	
OVERALL COURSE OBJECTIVE:	1. Equip learners with the technical skills to import, clean, and structure data using tools like Excel, SQL, and Python. 2. Analyse data patterns, trends, and relationships to uncover insights and solve real-world problems. 3. Facilitate the creation of advanced data visualizations and dashboards to enhance decision-making processes. 4. Foster the ability to construct and evaluate causal models to support logical, data-driven decision-making. 5. Develop communication and storytelling skills for presenting insights and recommendations effectively to various stakeholders.

LEARNING OUTCOME:	1. Analyze datasets by applying cleaning, transformation, and structuring techniques to prepare data for meaningful analysis. 2. Evaluate data trends, anomalies, and relationships to generate actionable insights and support data-driven decisions. 3. Design advanced visualizations and dashboards that effectively communicate key insights to stakeholders. 4. Construct evidence-based causal models to explain relationships within datasets and support strategic recommendations. 5. Develop compelling narratives and presentations to convey insights and influence decision-making processes.

TABLE 2: MODULE WISE COURSE CONTENT AND OUTCOME				
SL. NO	**MODULE NAME**	**MODULE CONTENT**	**MODULE LEARNING OUTCOME**	**DURATION (HRS)**
1	Foundations of Data Analytics	-Overview of data analytics, importance, and application areas. -Cleaning and formatting data using Excel, handling missing values, and outlier detection. -Using formulas, pivot tables, and conditional formatting for analysis.	-Analyze key areas of application for data analytics. -Examine and deconstruct data cleaning processes for accuracy. -Organize and outline data for meaningful insights using Excel tools.	9
2	SQL for Data Extraction	-Writing SQL queries, filtering, grouping, and exporting data. -Using aggregate functions like SUM, AVG, and COUNT for summarizing datasets.	-Categorize and structure datasets using SQL queries. -Perform data aggregation and summarization.	9

3	Pandas Library Basics	-Introduction to Python's Pandas library, Data Frame creation, and exploration. -Data transformation techniques, reshaping, and merging datasets. -Using Matplotlib and Seaborn for creating basic visualizations.	-Analyze datasets by organizing and structuring with Pandas. -Examine transformations for optimized data usage. -Critique and validate data quality for decision-making.	9
4	Advanced Visualization Techniques	-Building multi-variable charts and customized plots in Seaborn. -Crafting compelling narratives using visuals and dashboards. -Basics of causal reasoning and creating causal graphs from datasets.	-Develop insightful and interactive visualizations. -Design insightful visualizations to communicate complex patterns. -Generate and justify narratives for stakeholders using dashboards.	9
5	Recommendation Models	-Introduction to predictive modelling and making actionable recommendations. -Combining data from multiple sources and integrating tools for analysis.	-Create actionable models to solve analytical problems. -Combine and analyze multi-source data. -Validate and verify data quality.	9

		-Techniques to ensure data integrity, accuracy, and consistency.		

TABLE 3: OVERALL COURSE LEARNING OUTCOME ASSESSMENT CRITERIA AND USE CASES			
LEARNING OUTCOME	**ASSESSMENT CRITERIA**	**Performance Criteria**	**USE CASES**
Analyze and execute SEO and SEM techniques	Examine keyword optimization and ad tracking methods.	Categorize and evaluate keywords to improve campaign ROI.	Compare and optimize keywords for a small business website.
Organize, clean, and structure data	Assess accuracy in handling missing values and formatting datasets.	Prepare datasets by deconstructing errors and redundant data.	Clean and format a dataset for a retail sales dashboard.
Analyze and manipulate data effectively	Summarize trends, test anomalies, and diagram data relationships.	Generate data summaries that highlight patterns and insights.	Analyze customer transaction data to identify purchase trends.
Design and build insightful visualizations	Develop charts and diagrams to uncover and evaluate	Visuals must effectively support decision-making insights.	Visualize sales and revenue trends for a retail company.

	relationships in data.		
Formulate causal reasoning principles	Construct and defend logical causal models explaining relationships.	Create evidence-based causal graphs to support insights.	Build a causal graph for factors influencing product demand.
Compose and communicate actionable insights	Evaluate data insights and design presentations for clarity and impact.	Present recommendations that justify business strategies.	Create a data-driven business plan for stakeholder review.

TABLE 4: LIST OF FINAL PROJECTS (PROJECTS THAT COMPREHENSIVELY COVER ALL THE LEARNING OUTCOME)

SL.NO	FINAL PROJECT
1	Clean and analyse retail sales data to identify missing values and remove outliers.
2	Create a visualization showcasing monthly revenue trends for an e-commerce platform.
3	Develop a causal graph to explain the impact of marketing campaigns on customer retention.
4	Design an interactive dashboard for a small business to monitor key performance metrics.

5	Analyze the performance of an ad campaign and suggest actionable improvements.
6	Use SQL to extract sales data for a specific region and present aggregated results.
7	Build a predictive model to recommend the best-selling products for a retail store.
8	Develop a story-driven presentation explaining business outcomes based on data analysis.
9	Integrate multiple data sources and create a consolidated analytics report.
10	Validate data quality for a company's internal operations and identify inconsistencies.

TABLE 5: COURSE ASSESSMENT RUBRICS (TOTAL MARKS: 75)

ASSESSMENT CRITERIA	**Learning Outcome**	**Fair (1–5)**	**Good (6–10)**	**Excellent (11–15)**	**TOTAL MARKS**
Data Loading and Cleaning	Accuracy in importing, cleaning, and structuring datasets.	Data partially cleaned; missing values or redundant data remain; structure is incomplete.	Data cleaned with minor inconsistencies; missing values and redundancies addressed effectively.	Data fully cleaned with no errors; well-structured and ready for advanced analysis.	15

Insight Identification	Ability to identify trends, anomalies, and key data patterns.	Basic summaries provided but fail to highlight actionable insights; trends not clearly identified.	Key trends identified with some actionable insights; anomalies are partially addressed.	Comprehensive analysis of trends and anomalies with well-justified actionable insights.	15
Data Manipulation and Summary	Proficiency in summarizing and transforming data for effective analysis.	Basic manipulation performed; summaries lack clarity or depth.	Data effectively manipulated and summarized; some advanced techniques used	Data manipulated creatively with advanced methods; summaries highlight clear and actionable insights.	15
Visualization and Presentation	Skill in designing visualizations and crafting presentations to support insights.	Basic charts provided; visuals lack clarity or fail to emphasize key insights.	Clear and well-structured visuals; presentation communicates insights with minor gaps.	Innovative, insightful visuals; presentation highly engaging and emphasizes actionable takeaways.	15
Communication and Storytelling	Effectiveness in conveying data-driven narratives	Narrative lacks focus; recommendations are unclear or	Narrative is clear with actionable recommendations;	Compelling, well-structured narrative; recommend	15

	and recommend ations.	not actionable.	some storytelling techniques are employed.	ations are impactful and effectively communicat ed.	